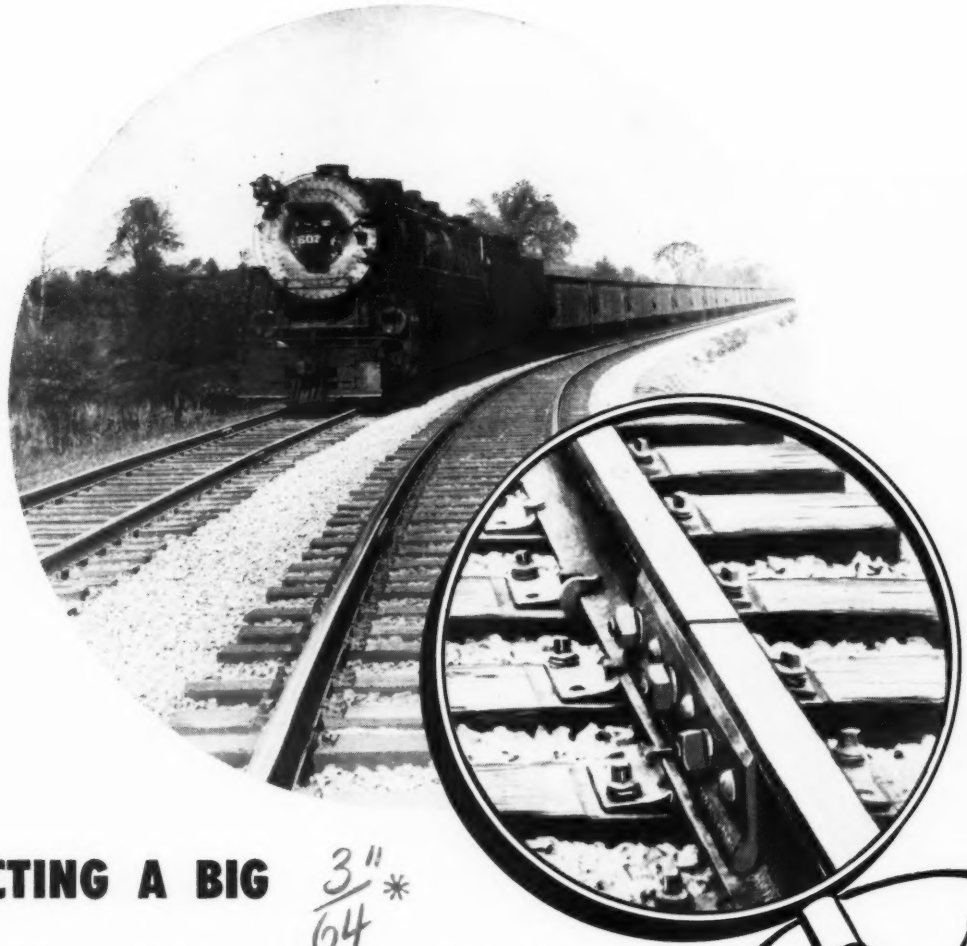
ROADMASTERS CONVENTION NUMBER OCTOBER, 1948

Railway Engineering and Maintenance



PROTECTING A BIG 3/64" *

TO CUT RAIL JOINT MAINTENANCE COST

* Experience has proven that when rail-end wear and batter reaches a depth of 3/64", it is noticeable in the riding quality of the track and that, from this point, if the condition is not corrected, deterioration of rail ends and joint structures is greatly accelerated.

Reliance Hy-Pressure Hy-Crome Spring Washers help to protect this vital 3/64" by keeping rail joint bolts *tighter longer* and postpone the necessity for costly rail-end conditioning and joint bar reforming and shimming. The inherent reactive pressure in Reliance Hy-Pressure Hy-Crome Spring Washers automatically compensates for dimensional changes in the rail joint assembly. This reduces the possibility of rail end batter and chipping, thus extending the period between maintenance operations and reducing costs.

Edgemark of Quality

Reliance **HY-PRESSURE HY-CROME** *spring washers*

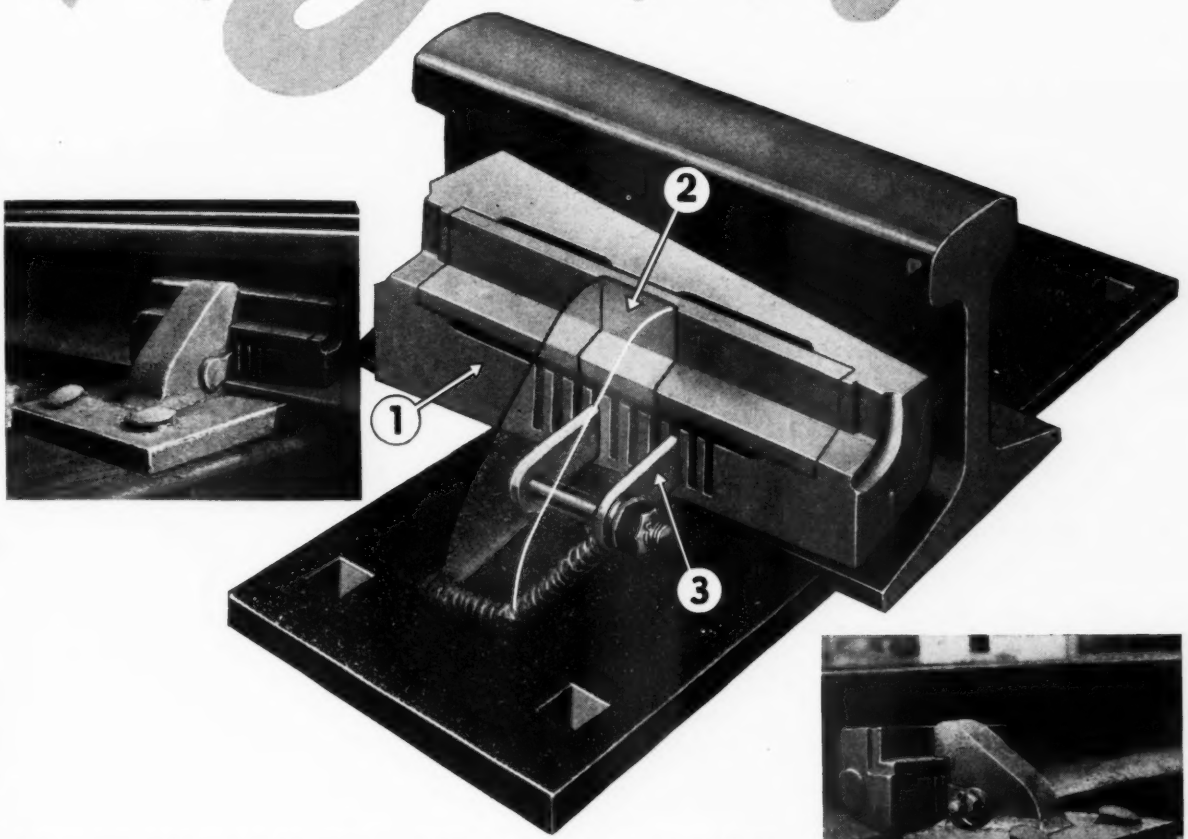
EATON

EATON MANUFACTURING COMPANY

RELIANCE DIVISION
MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

Tight!



A brace isn't doing its full job unless it fits absolutely tight against the rail; unless it can take the most vicious thrust without loosening.

By any standard you can name, Bethlehem's 811 is a regular bulldog of a brace, and when it's once installed and locked we challenge any service shock or series of shocks to budge it. Here's why it can't loosen up under traffic:

Rigidity is achieved by a tight-fitting wedge (1) that is driven between rail and brace (2). The farther the wedge is driven in, the snugger the fit becomes. A steel compression spring, integral with the wedge, makes the squeeze more effective. The constant pressure eliminates movement; hence there is no friction, no wear. As added protection against loosening, there's a double pawl (3) that turns down into slots, thereby preventing the wedge from backing up. We don't know any other rail brace that does as good a job. The 811's so simple, so easy to install . . . so low in cost! No special tools are required for installation or maintenance. Ask for a demonstration under actual traffic conditions.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Bethlehem 811 Rail Brace ★ BETHLEHEM STEEL ★

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

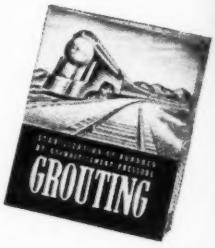
No More "Soft Track" Here

The Texaco method of asphalt-cement pressure grouting stabilizes track *quickly, lastingly, economically*

THE efficiency of the Texaco method of asphalt-cement pressure grouting in stabilizing "soft track" has been widely proved. For easy application, lasting results, low first cost, and low maintenance costs over the years, this method is truly outstanding.

Simply add a small quantity of *Texaco No. 24 Emulsified Asphalt* to the cement-and-sand mixture. This emulsified asphalt, developed especially for grouting, promotes easier flow, better penetration, and more thorough seal. Thus, the work goes quicker, and lasting stability is achieved through improved resiliency.

A Texaco representative will gladly explain in detail this cost-saving method of track stabilization. Just call the nearest Railway Sales Division office listed below, or write The Texas Company, *Railway Sales Division*, 135 East 42nd Street, New York 17, New York.



SEND FOR this fact-packed, 16-page, illustrated book. Describes the development of asphalt-cement pressure grouting, outlines a practical working set-up, shows costs, and benefits secured by a leading railroad.

NEW YORK • CHICAGO • SAN FRANCISCO • ST. PAUL • ST. LOUIS • ATLANTA

TEXACO

TEXACO Emulsified Asphalt FOR GROUTING

Tune in . . . TEXACO STAR THEATRE every Wednesday night starring Milton Berle. See newspaper for time and station.

YOUR 1ST NORTHWEST IS OUR BEST SALESMAN!

Watch a Northwest in the heart of a job like this. Note the smooth swing — the accuracy in spotting — the positive, easy, effortless control.

Northwests bring you a combination of features found in no other similar equipment and they bring a versatility that is priceless in maintenance-of-way. They load or unload on a standard flatcar, drop-end gondola or highway trailer under their own power. They work on or off that line, from the car or from the ground. They will handle any type of equipment that can be fastened to a cable from a clamshell to rail tongs.

They trim bank, dig ditch, lay rail, load or unload material, drive piles and handle or lift anything within their rated capacity. A Northwest will mean a distinct reduction in maintenance-of-way costs.

You can't afford anything but the best for the heart of your job. Put a Northwest in the *Key Spots* and be sure of dependable operation. You can make your plans far ahead to have a Northwest on your section. Let us tell you how. Send for complete details. Your 1st Northwest will be our best salesman.

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Chicago 3, Illinois

NORTHWEST

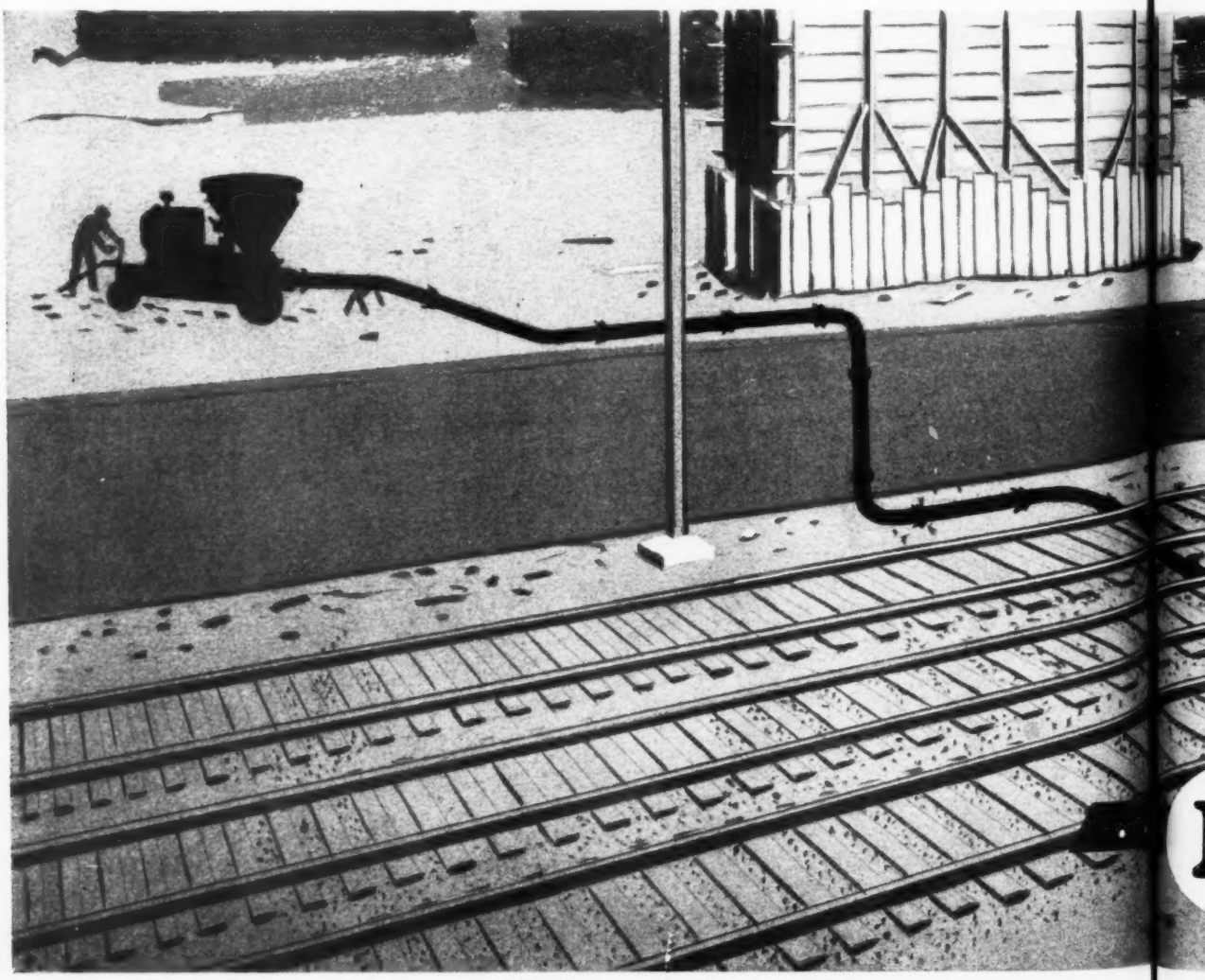
PURPOSE RAILROAD MACHINE
CRANE • DRAGLINE • SHOVEL

How to place concrete.....

Rex Pumpcrete, *the pump that pumps concrete through a pipe line,* makes it easy to place concrete on your construction and maintenance jobs without disrupting rail traffic! Note the illustration below. Sketched from an actual application, it illustrates how Pumpcrete and pipe line placement were used to place concrete for the forms of an overpass over the main line and service tracks of a number of railroads leading into a large city.

The Pumpcrete was located well off the right-of-way and the pipe line ran under and alongside the tracks to the forms. No chance here to interfere with rolling stock and disrupt schedules. Add to this the fact that Pumpcrete delivers concrete without segregation, assuring the highest quality . . . highest strength concrete of any placement method.

Overpasses, underpasses, culverts, bridges, warehouses, stations, docks are but a few of many jobs Pumpcrete is doing for railroads. It's the efficient way to place concrete . . . *fastest, lowest cost.*

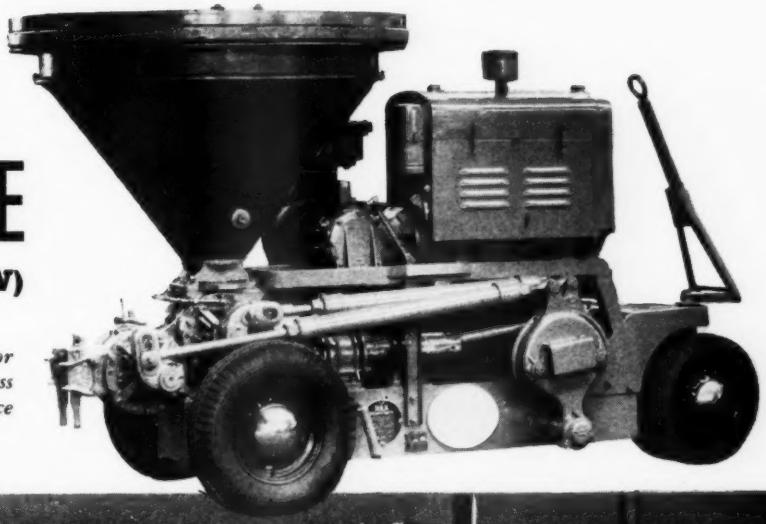


..without disrupting traffic!

REX PUMPCRETE

(SYSTEM KOOYMAN)

For all the facts on Pumpcrete, send for your copy of Bulletin No. 47-25. Address Chain Belt Company, 1601 West Bruce Street, Milwaukee 4, Wis.



Years of Shelter *Built in a Day*

It takes only a few hours to erect a Standard ARMCO STEELOX Building, and you have a strong, sturdy structure that will last for years.

The unique STEELOX joint does the trick. Individual panels go into place like magic to provide both structural support and finished surface. For sidewalls they save framing and outside covering. On the roof they replace rafters, sheathing and roofing. Erection is simplified, costs go down, and weathertight construction is assured.

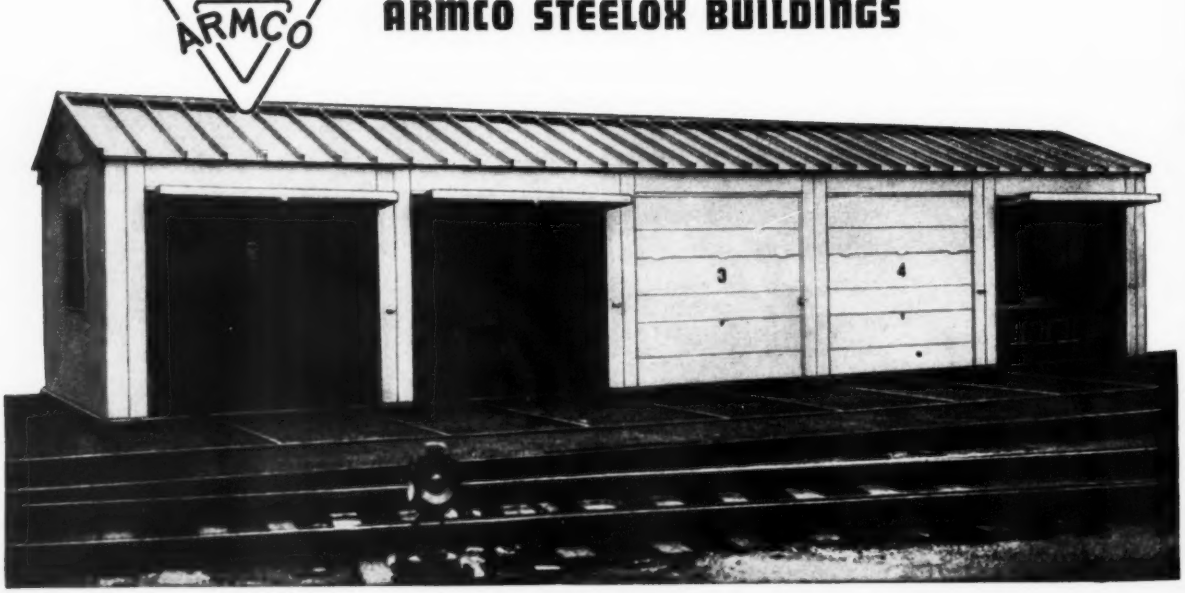
But these are only a few of the advantages. With all their strength, STEELOX Panels are light and easy to handle. A small, unskilled crew quickly makes a strong, tight, fire-resistant structure that combines all the advantages of a permanent building with high salvage value. When used at temporary locations STEELOX Buildings can be quickly dismounted and re-assembled on another site.

You can get prompt delivery on Standard ARMCO STEELOX Buildings for utility buildings, motorcar garages, offices, warehouses, wayside buildings or wherever else you need an easily-erected, permanent or temporary structure. Write for prices and complete information. Armco Drainage & Metal Products, Inc., 3865 Curtis Street, Middletown, Ohio.

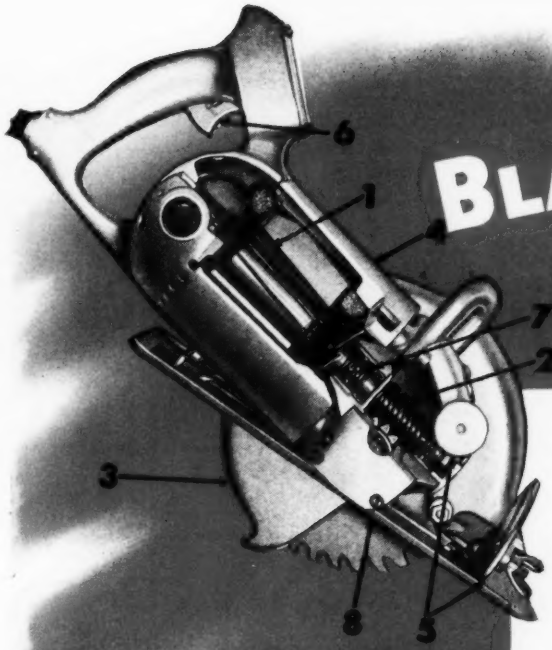
Export: The Armco International Corporation.

ARMCO

ARMCO STEELOX BUILDINGS



For additional information, use postcard, pages 1073-1074



BLACK & DECKER QUALITY in the SAW...

1 B&D-built heavy-duty universal motor, specially designed with oversize commutator and brushes, for tough saw service.

2 Steel worm and bronze worm wheel in 7″ and 9″ Saws. Helical steel pinion and bronze gear in 8″ Saw. Heat-treated pinions.

3 Ball-bearing safety blade guard telescopes as cut is started; instantly covers blade as cut is finished.

4 Aluminum housings—light and rugged.

5 Quickly adjusted for desired depth of cut and for angles up to 45°.

6 Instant-release safety trigger switch in "saw-grip" handle.

7 Extra large ball bearings for every revolving part, protected by special oil seals. Special thrust bearing on spindle.

8 Splined spindles provide maximum strength and eliminate loose keys. (Not shown in this view).

... SLASHES SAWING TIME on the JOB

The work you get out of tools depends on what's built into them! That's why thousands of users swear by quality-built Black & Decker Electric Quick-Saws.* They'll save you time and money—ripping, cross-cutting, angle-cutting, grooving, dadoing—in wood, metal, stone and compositions—ten times faster than hand sawing. Easy to change blades and discs. Operate on any standard power line or portable generator. See your nearby B&D Distributor for popular-size 7″ Quick-Saw, at $115.00; the close-coupled 8″ Quick-Saw, at $135.00, for cut-off operation; the 9″ Quick-Saw, at $150.00, for heavier cuts. Write for free catalog to: The Black & Decker Mfg. Co., 663 Pennsylvania Ave., Towson 4, Md.

*Trade Mark Reg. U. S. Pat. Off.

BLACK & DECKER QUICK-SAW ARM $148.00

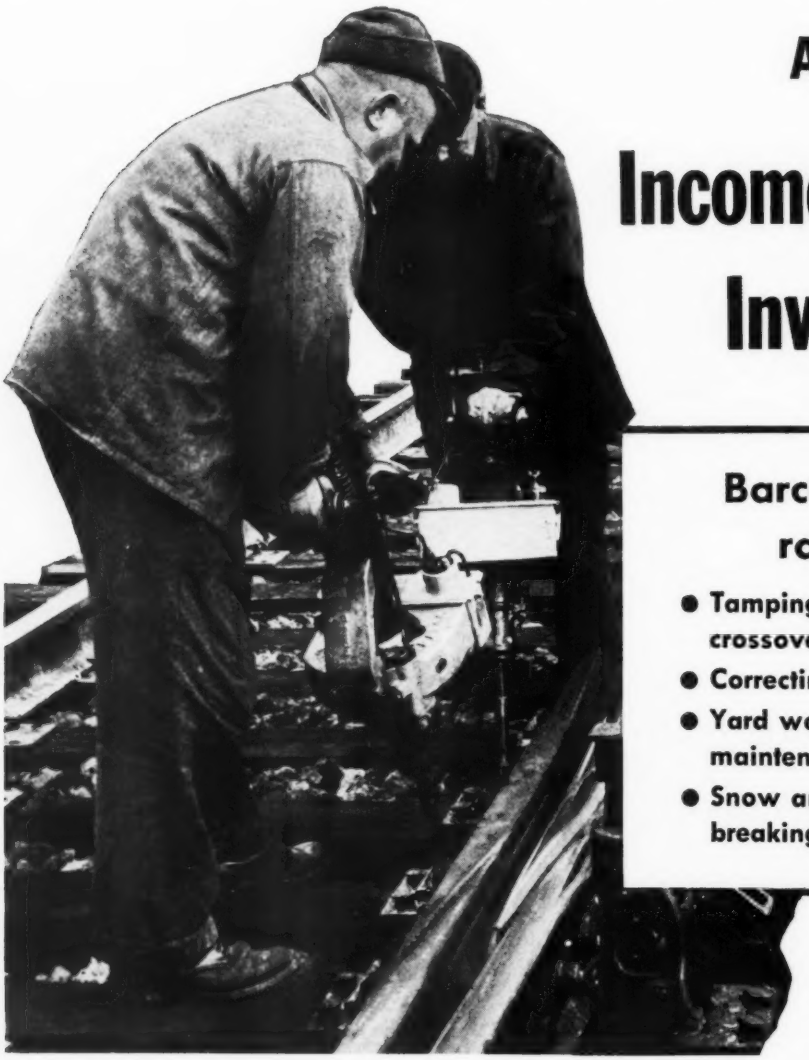
Doubles the usefulness of your Portable Electric Saws! Helps you do radial as well as portable sawing with the same tool. Greater accuracy. Less operator fatigue. All three B&D Quick-Saws (and most other makes) fit into the adjustable carriage in a jiffy.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

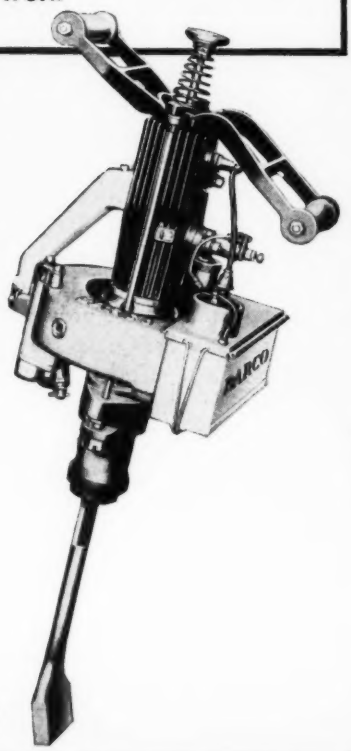
PORTABLE ELECTRIC TOOLS

TWO BARCO TYTAMPERS PER SECTION ARE AN Income-Producing Investment



Barco does a wide range of jobs

- Tamping interlocking switches, crossovers
- Correcting low spots
- Yard work and miscellaneous maintenance
- Snow and ice removal and light breaking work

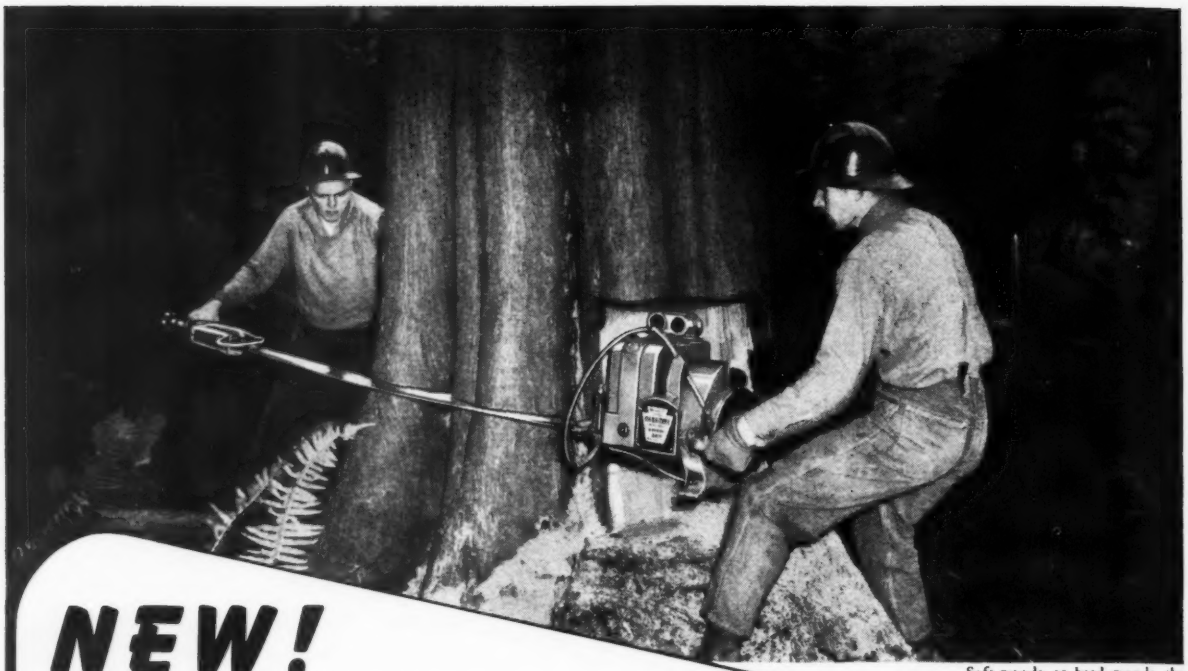


Armed with 2 Barco Tytampers, a section gang can eliminate frequent resurfacing of track and provide much easier riding for passengers, reduce wear and tear on equipment. Over 100 American railroads prefer Barco because they want *income-producing* equipment that gives maximum maintenance at lowest cost. Light in weight and correctly balanced, Barco is self-contained, provides easy portability on busy right-of-ways, is the only tamper that tamps cemented ballast. For detailed information, write Barco Manufacturing Company, 1805 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Company, Ltd., Montreal, Canada.

BARCO

UNIT TYTAMPERS

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY



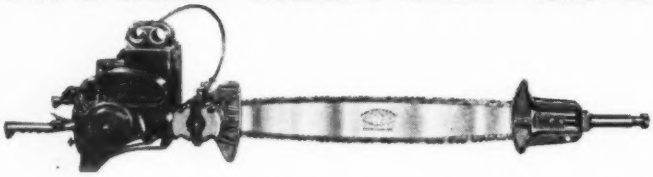
Soft woods, or hard woods, the Disston 12 H.P. Chain Saw takes them all in stride.

NEW!

THE *EXTRA* POWERFUL

DISSTON 12 H.P. *HEAVY-DUTY*

TWO-MAN CHAIN SAW with Mercury Gasoline Engine



Put this husky Disston Chain Saw to work on your toughest timber-cutting jobs. See how fast it gets them done. Note how smoothly the saw cuts through knots and wet, frozen or abrasive woods. It's built specially for work like that . . . with extra reserve power and extra ruggedness for dependable performance in ALL heavy-duty felling and bucking operations.

This new model retains all the fine qualities of other Disston chain saws, PLUS added power and other features to further boost your production and cut costs. To name a few:

New 12-hp., 2-cycle, 2-cylinder engine . . . an abundance of power.

New—Quick-Detachable Tail Stock.

New Guide Rail.

New Transmission . . . with more rugged housing to withstand rough treatment.

New Abutment Plate . . . shape provides additional protection for transmission by *keeping saw out* from under a bucking cut.

Write for full particulars and name of nearest dealer.

DISSTON ELECTRIC CHAIN SAW SHARPENER

enables you to do your own sharpening . . . easily and accurately. Saves time. Keeps chains in first class condition . . . both one-man and two-man.

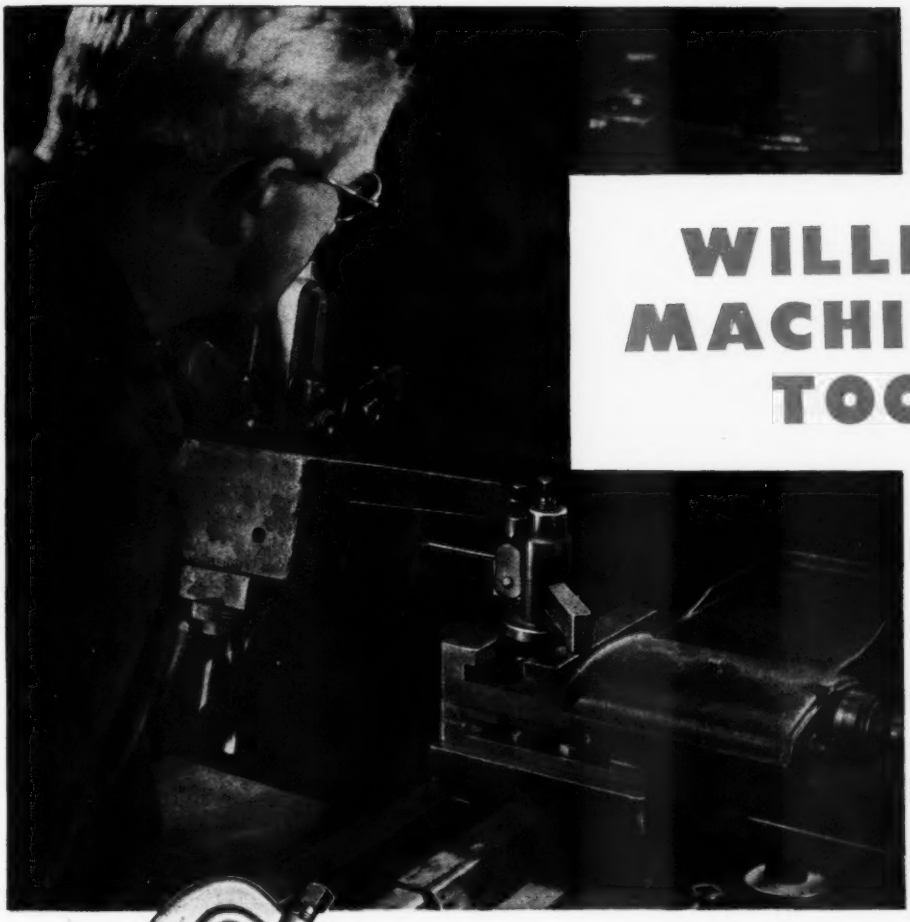
AUTHORIZED DEALERS and CERTIFIED SERVICE STATIONS

from coast to coast always ready to serve you. Let your dealer show you how easy it is to own one of these profit making saws . . . how easy it is to pay.

HENRY DISSTON & SONS, INC., 1041 Tacony, Philadelphia 35, Pa., U.S.A.

***Canadian Factory*: 2-20 Fraser Ave., Toronto 1, Ont.**

ESTABLISHED 1840 TRUTH WORTH
REG. U.S. PAT. OFF.



WILLIAMS MACHINISTS' TOOLS

Williams Light, Boring-Tool Holder. A handy and economical tool for light boring, internal threading and turning.

REDUCE SHOP & TOOLROOM COSTS

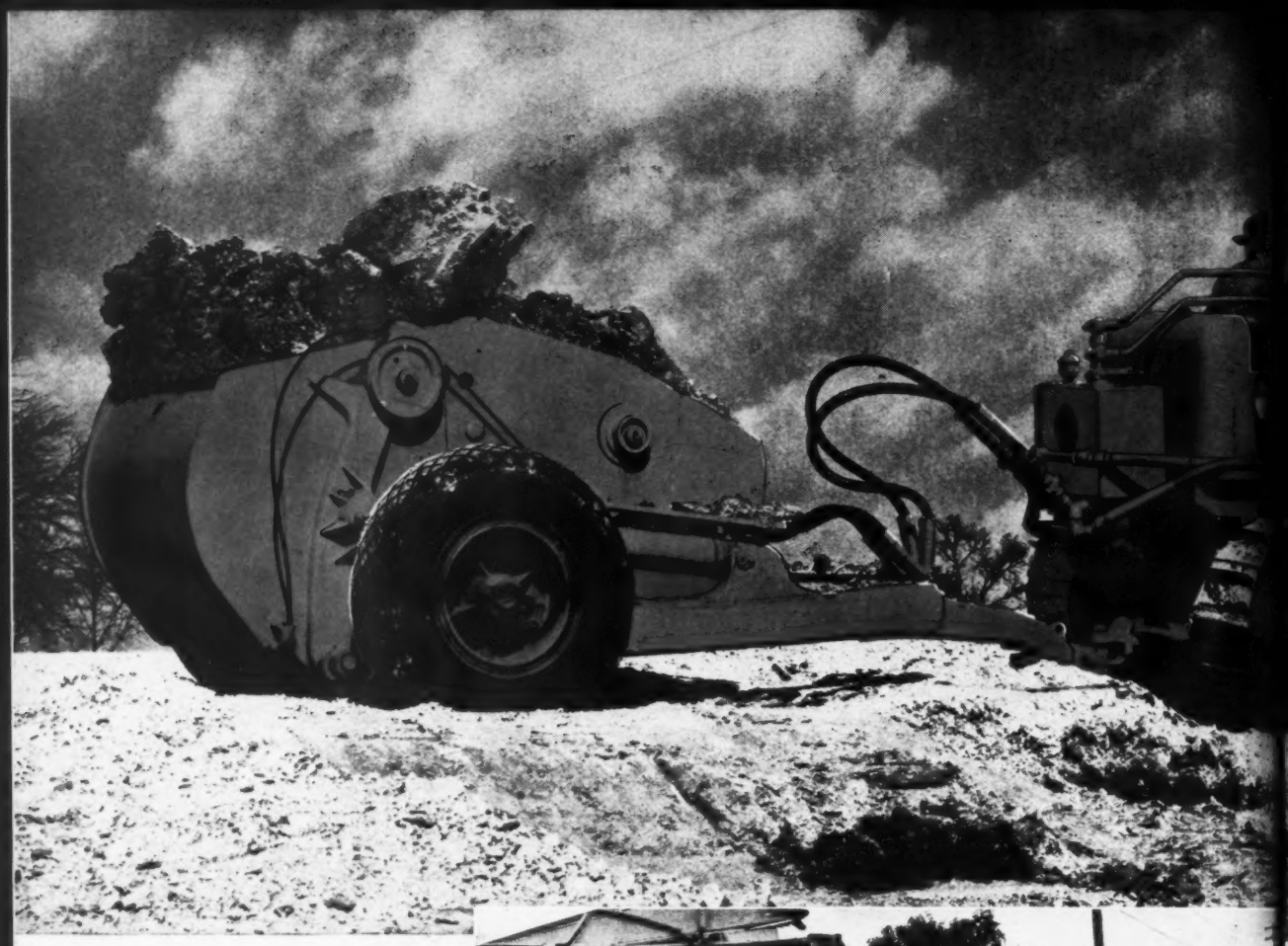
The fine design, convenience and dependable performance of Williams Drop-Forged Tools have earned them a preference by experienced machinists everywhere. They will help you produce *better* work at *lower* cost. Write for your copy of "Williams Machinists' Tools"... a 36-page booklet fully describing Williams' line of Tool Holders, Lathe Dogs and "C" and Strap Clamps.

WILLIAMS

• OUR DISTRIBUTOR IS YOUR LOCAL WAREHOUSE

OPEN END, BOX, ADJUSTABLE & RATCHET WRENCHES; DETACHABLE SOCKETS & SETS; IMPACT SOCKETS; TOOL HOLDERS; LATHE DOGS; "C" CLAMPS; CHAIN PIPE TONGS & VISES; FLANGE JACKS; PLIERS; SCREWDRIVERS; PUNCHES & CHISELS; SOFT FACED "NUPLAFLEX" TIPPED HAMMERS; HOIST HOOKS; EYE BOLTS; ROD ENDS; CRANK & BALANCE HANDLES; THUMB SCREWS & NUTS.

J. H. WILLIAMS & CO., BUFFALO 7, N. Y. *Distributors Everywhere*



FAST WORKING

Allis-Chalmers Tractors quickly return tracks to service after wrecks, washouts, other traffic interruptions . . . are easily moved by flat car, trailer or under own power, go into action immediately . . . work at many points all along tie-up . . . build shooflies in record time.

VERSATILE

Allis-Chalmers Diesel Tractors are used with bulldozers, scrapers or front end shovels on stockpiling—also with rollers, rippers, graders, snow plows, winches, tractor cranes on any number of jobs. Go anywhere . . . handle grading jobs impossible to reach with work trains.

FLEXIBLE

You can put exactly the number of tractors on a job that are required—one or two on a regular job or a fleet on a big, rush project. There is a right size Allis-Chalmers tractor for any grading or maintenance job.

One man WORK CREW

NO INTERFERENCE

Operating free of the tracks, this Allis-Chalmers HD-7 Tractor with Gar Wood bulldozer and 5-yd. scraper keeps working while your trains go through on schedule — no interruption of traffic or maintenance work. Many railroads find that tractors put in as much as 50 percent more production time than rail-bound equipment.

☆ ☆ ☆

ONE man grades slopes, backfills, easily handles ditching, diking — many other right-of-way jobs with an Allis-Chalmers 2-cycle Diesel Tractor equipped with bulldozer and 2-wheel, rear-dump scraper.

This fast-stepping outfit takes over much of the work of big track-bound equipment, does not interfere with rail traffic, relieves hand labor. It digs and loads toughest materials, carries and places them exactly where wanted — on slopes, around bridges, culverts, other close places. Ideal for stockpile maintenance.

It will pay you to investigate this one-man outfit for reducing construction and maintenance costs. We will be glad to put you in touch with your Allis-Chalmers dealer for complete details.

2-cycle Diesel Tractors
4 Models
11,000 to 40,000 lb.

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Motor Graders
Power Units
Road Machinery

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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

PAGE *Welding* ELECTRODES

STEP 1 toward better production welding

"Getting in touch with Page" doesn't always mean ordering a shipment of welding electrodes or rods. Sometimes it means getting some up-to-the-minute information on the right size or analysis of rod—the most efficient welding technique—how some other welder has licked the same kind of problem that comes up in your plant.

Your PAGE distributor is a responsible source for all types of electrodes and rods—specializing in PAGE-Allegheny stainless steel. And if he doesn't know the answer to your welding question, he can get the answer from a PAGE Field Service Man. So we say . . .

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TRADE MARK

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

For additional information, use postcard, pages 1073-1074

New Ingersoll-Rand TAMPING GUN

USES 40% LESS AIR!

Slash your maintenance of way costs with the new MT-4 Tamping Gun, which uses *at least* 40% less air than the Tamping Guns *you have in use today,* and develops the same, or even more, tamping power!

This means *more* tamping guns operating from the *same* compressors; it means *more* work with *less* air! A brand new design gives *longer maintained* operating efficiency—air consumption stays low for the life of the tool!

The MT-4 Tamping Gun is built to run *longer* with *less* attention and *less* wear. Rugged, simple parts slash "time-outs" for maintenance!

An Ingersoll-Rand representative will be glad to demonstrate this revolutionary Tamping Gun on *your* road. See it—try it—you'll want to buy it!

Act at once—the Ingersoll-Rand MT-4 Tamping Gun is now ready for *your* trackmen—wire or phone your Ingersoll-Rand branch office today!

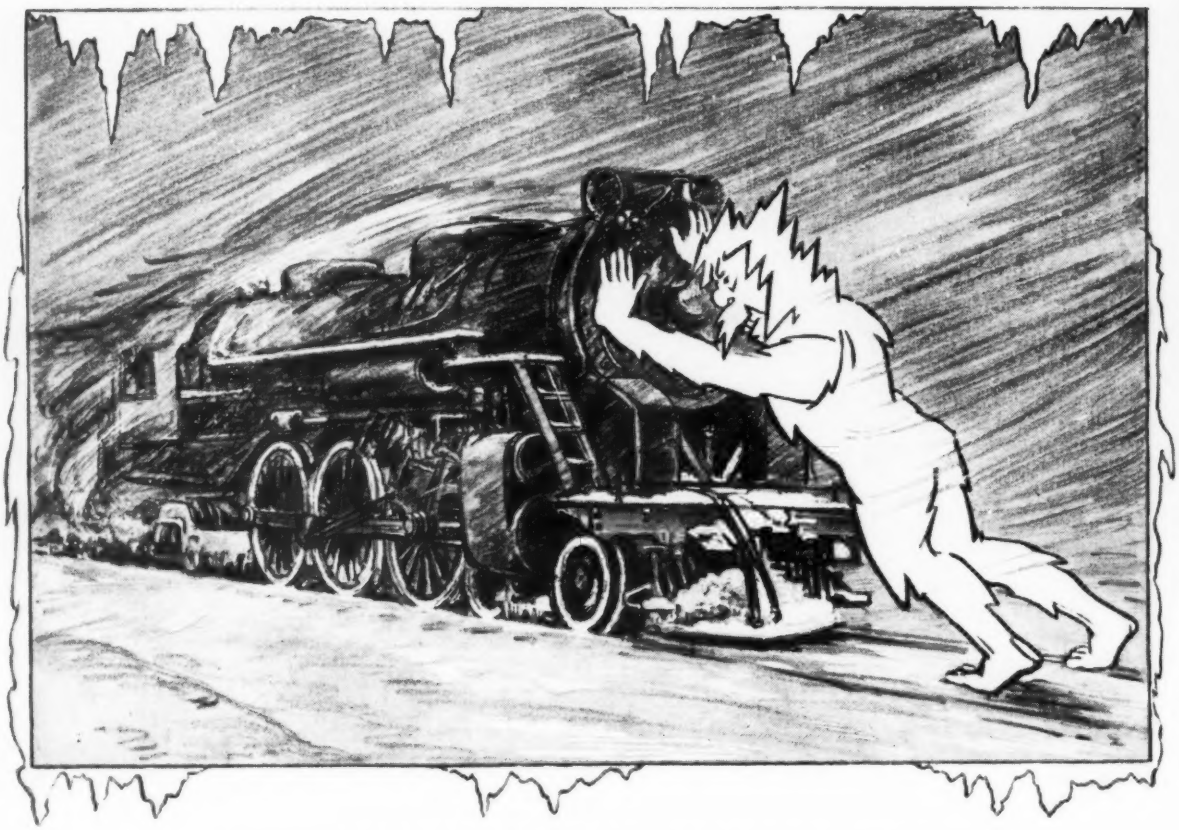
Ingersoll-Rand
Originator of Mechanical Tamping

Look to the first—for the finest!

Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

107-11

Stopped! By ICE



KEEP MOVING THIS WINTER WITH

KILFROST

New Chemical De-Icing Products

Kilfrost products are an entirely new means of combatting ice and winter lubrication problems. They are formulated to:

1. Prevent ice bonding to metal and other surfaces.
2. Give lasting lubrication.
3. Prevent corrosion.
4. Resist washing off in rain or snow.

Kilfrost has been successfully used in England for several years. Now tested and available in this country, it offers the practical answer to many de-icing problems . . . often so costly to our railroads.

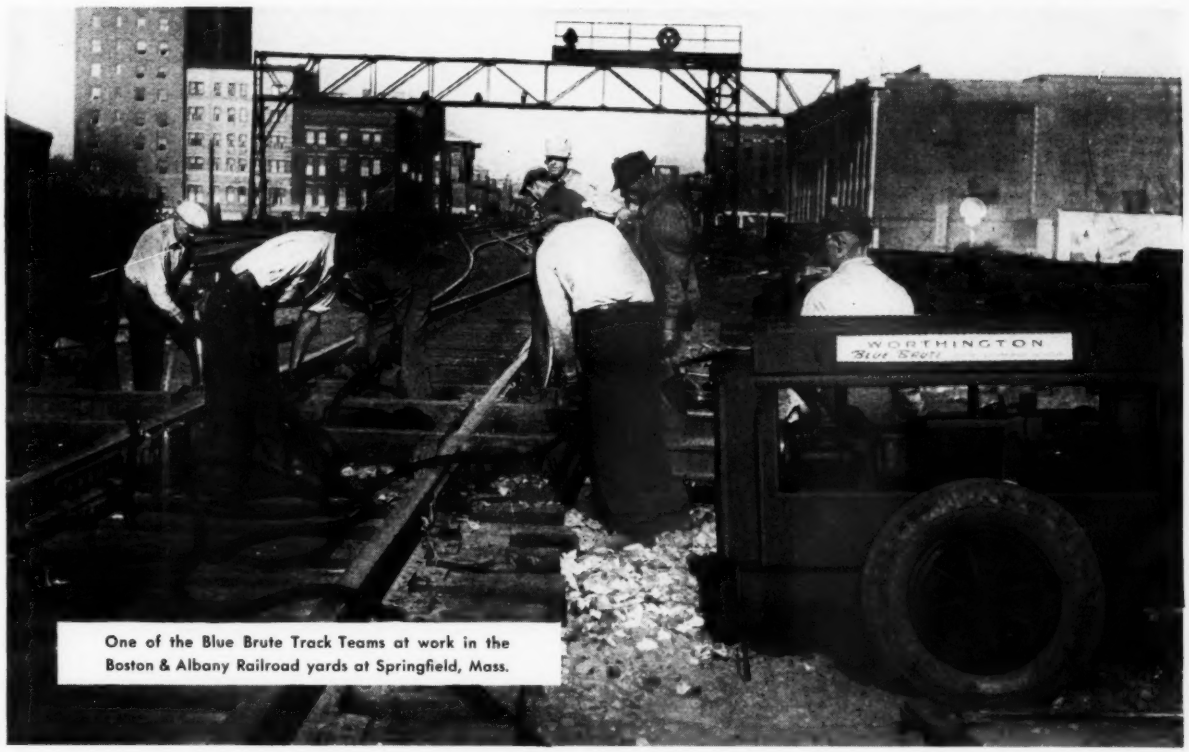
Kilfrost produces and maintains a soft, semi-liquid layer next to the treated surface . . . thus giving ice no opportunity for bonding action.

Find out more about Kilfrost before Winter comes!

CHIPMAN CHEMICAL COMPANY, INC.

BOUND BROOK, N. J.

TEAMWORK THAT CUTS MAINTENANCE COSTS



One of the Blue Brute Track Teams at work in the Boston & Albany Railroad yards at Springfield, Mass.

Count on this perfectly matched Blue Brute Track Team to do a lot of fast, efficient tamping, on very little air! The Hand-i-Air Compressor is as tough as they make 'em yet easily handled by two men. Through its easy-breathing Feather* Valves, this tireless, two-wheeled tornado delivers a steady supply of 60 cu. ft. per min. — ample for its four Blue Brute teammates.

They're the WTT-7 Tie Tampers. Men do *more* work with these light, precision-balanced 42-pounders — and do it *easier* and *faster* — while advantages like the leak-proof throttle and anti-freeze design mean tops in efficiency and economy under all conditions.

Adding up, here's teamwork that will surface more lineal feet of roadbed per day — every day. Such performance, remember, is typical of all Blue Brutes — the grouters, contractors' pumps, portable concrete mixers, air tools, etc. — that are cutting maintenance and construction costs all along the line. Checking on them — thoroughly — will be a smart move towards saving money in your own operations.

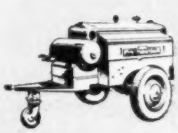
*Reg. U. S. Pat. Off.

H8-4

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Massachusetts
Distributors in All Principal Cities

BUY BLUE BRUTES



60' Portable Compressor

Portable Concrete Mixer

Self Priming Centrifugal Pump

Hand Held Air Tools

Railcar Compressor

FOR EVERY CONSTRUCTION AND MAINTENANCE JOB

NOW – An amazing new wood that resists fire!

Looks like ordinary wood, you say? Well it is wood. But not ordinary! It's a new kind of wood. Koppers has pressure-treated it with certain chemicals.

So what? So ordinary wood becomes amazingly different. It has far greater resistance to decay. It is completely unpalatable to termites. And get this: it is *fire-retardant!*

Yes, wood has joined the fire-safe materials! This Koppers Fire-Retardant Wood greatly reduces all fire hazards . . . has a high degree of resistance to the attacks of fire itself.

Thus, to all the advantages of wood . . . its easy workability, availability, decorative value, economy, re-use value . . . are added resistance to decay and termite attack as well as resistance to fire. Yet the odorless Koppers treatment does not harm the color or paintability of the wood.

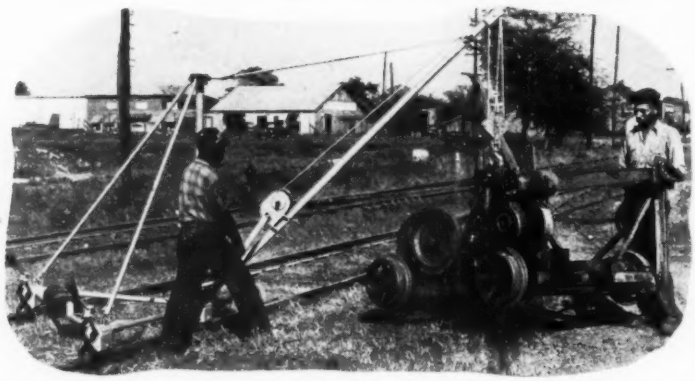
This amazing new wood that won't burn is ideally suited for floors, roofing, sheathing, and the structural members of plants, warehouses, docks, railroad engine houses, bridges, tunnel linings and similar structures. For more complete data, send for *Koppers Fire-Retardant Wood,* a new booklet containing interesting, helpful information about this latest development in pressure-treating wood.

KOPPERS COMPANY, INC. · Pittsburgh 19, Pa.

KOPPERS **PRESSURE-TREATED WOOD**

KERSHAW SHORTCUTS
TO LOWER TRACKWORK COSTS

1



KERSHAW UTILITY DERRICK

Two men with a Kershaw Utility Derrick can remove such trackwork equipment as cribbing machines, adzers, spike-pullers, spike drivers or tool cars from the track in less than one minute! Construction is of welded steel tubing, mounted on three double-flange steel wheels. Geared hand hoist has safety lock and quickly raises loads up to 2,000 lbs. weight. Rail clamps are positive-locking, hand-operated. Kershaw Utility Derricks save costly minutes of working time every day on your trackwork jobs—Ask for details, now.

2

KERSHAW SPIKE SETTER CARRIAGE

Two spike-setters with Kershaw Spike Setter Carriages can set spikes for air or mechanical hammers at the rate of one 39-foot rail every minute! Carriage weighs only 65 lbs. empty, holds 1½ kegs of spikes. Saves the time of four men formerly needed to distribute spikes, and effectively prevents loss of spikes along right-of-way.

Write for complete data on these and other Kershaw Equipment shortcuts to lower trackwork costs.

THE KERSHAW CO., INC.

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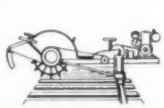
3



KERSHAW KRIBBER
(Single-Wheel Type)

4

KERSHAW
BALLAST PLOW
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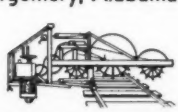
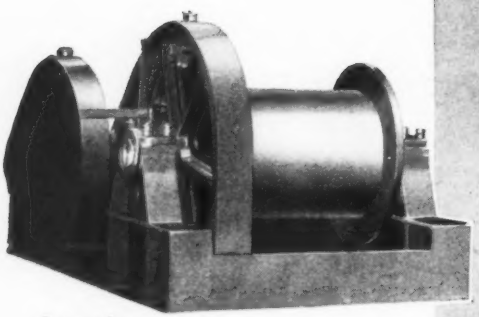


KERSHAW KRIBBER
(Three-Wheel Type)



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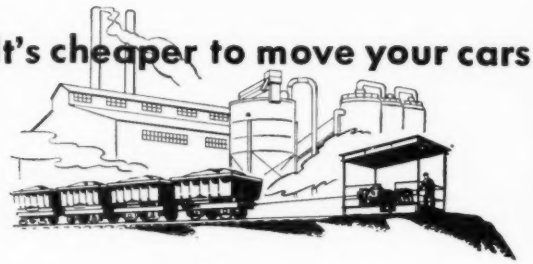

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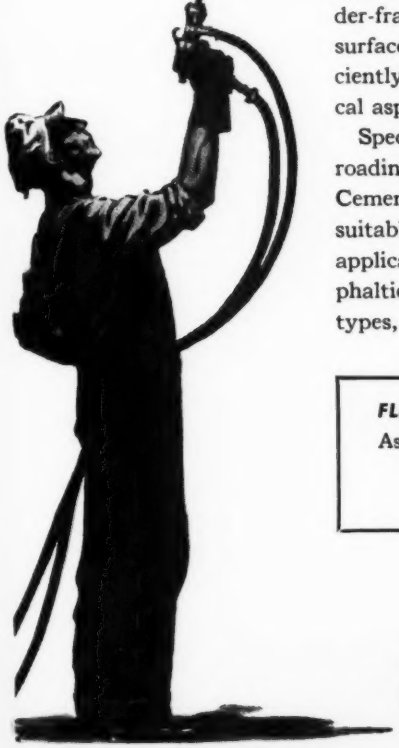
FOUNTAIN OF YOUTH FOR ROLLING STOCK



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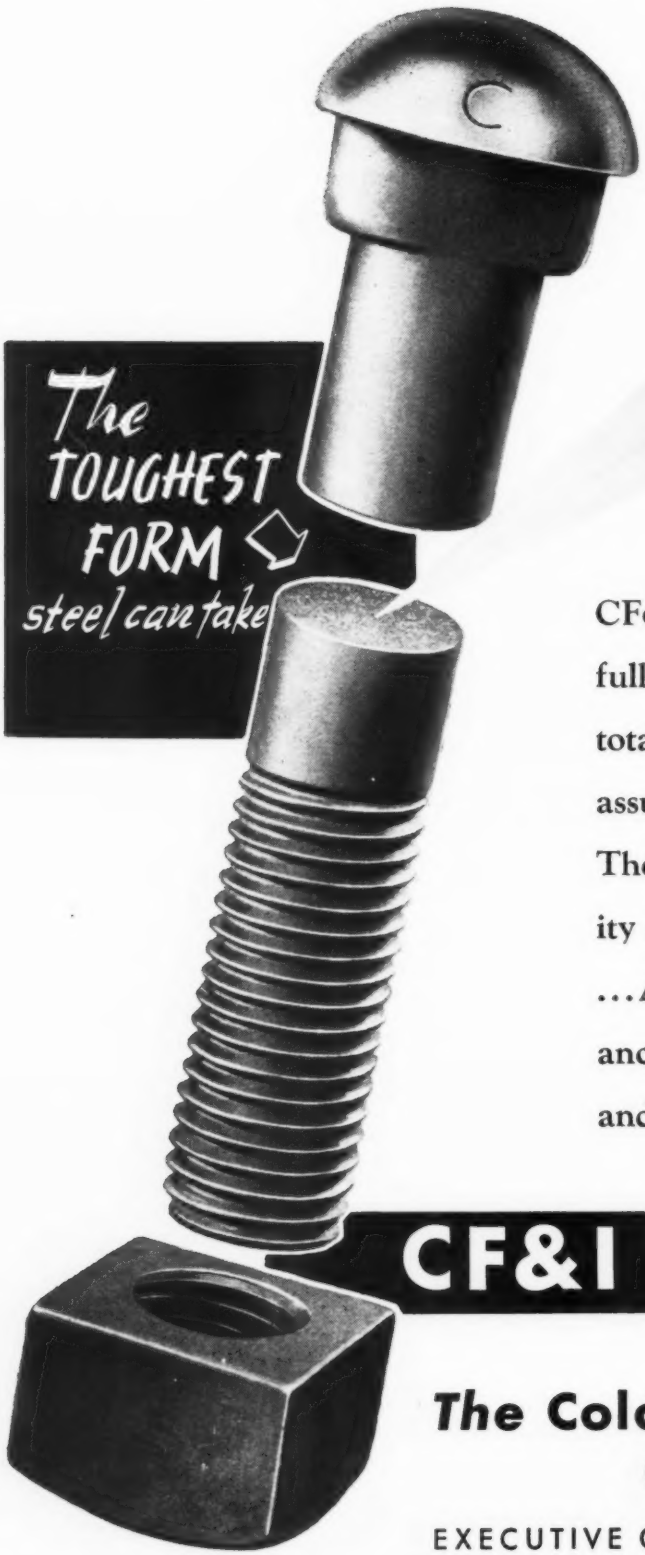
Metallurgists call it "SORBITE"



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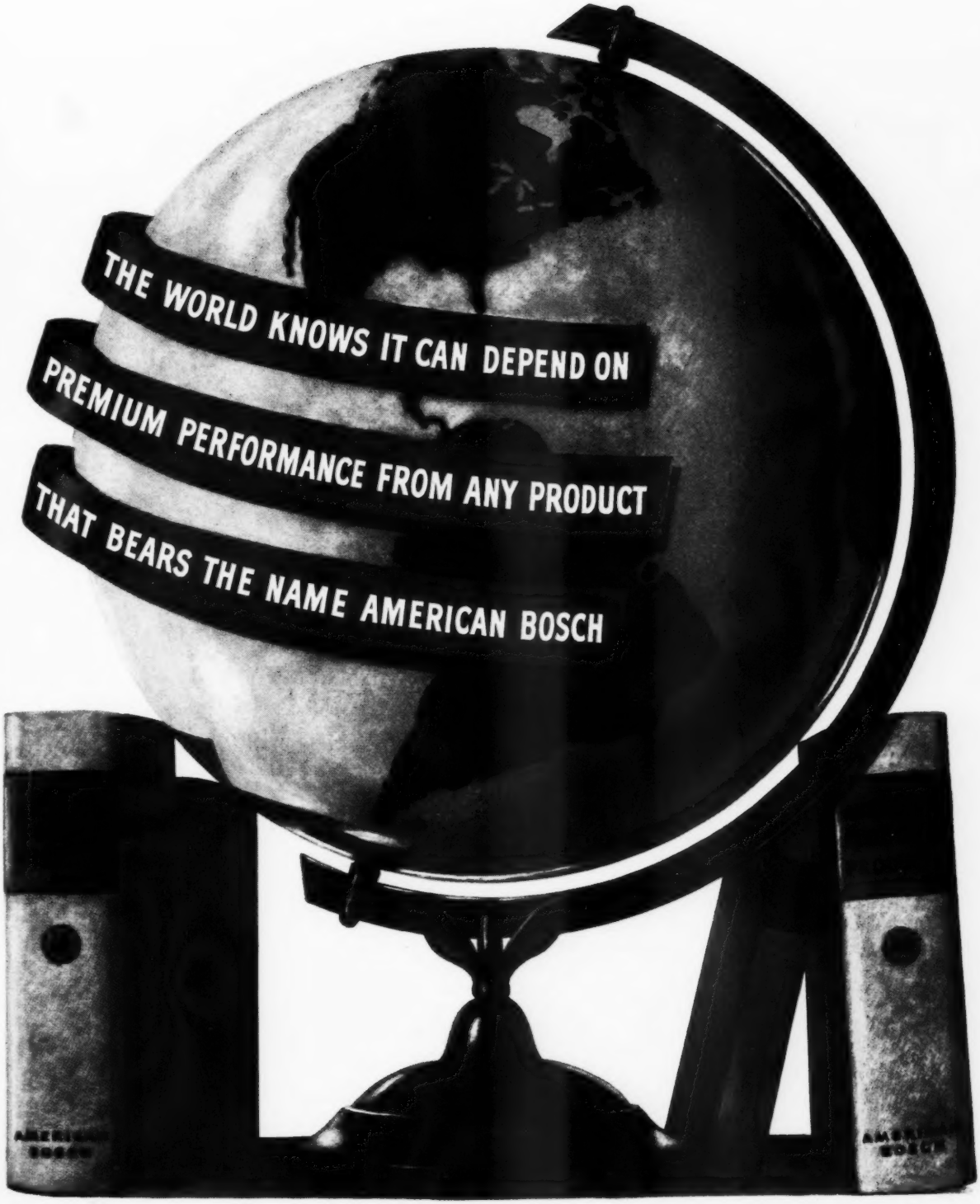

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Here's "bridge-work" that's in for good...

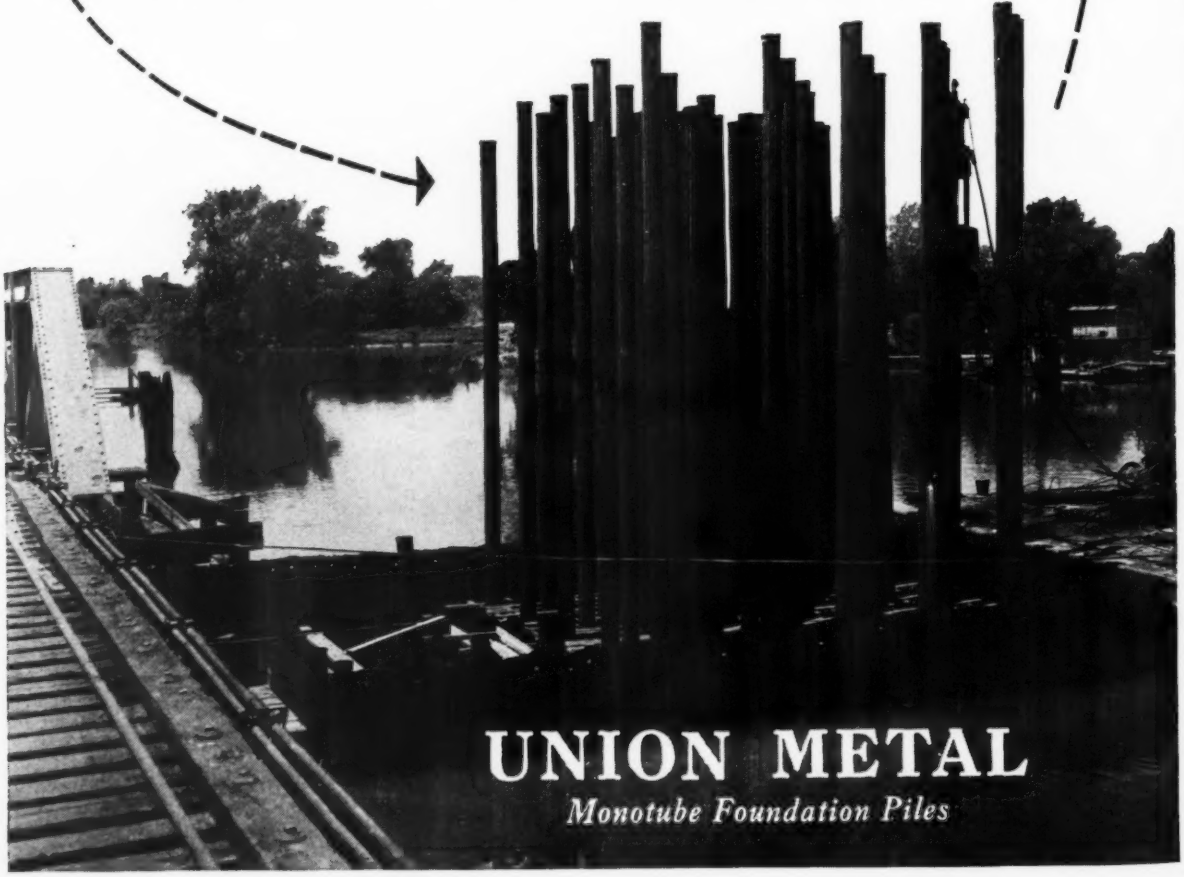
on a MONOTUBE foundation

HERE is another foundation job getting started *right*—with Monotube tapered steel piles. Approximately three hundred and fifty 3 and 7 gauge piles were used to make this railway "bridge-work" good for years of service. Pile lengths varied from 45′ to 70′.

The job's construction superintendent wrote: "The Monotube piles were driven by use of a timber grillage for holding the piles in position and eliminating the use of leads. The light, rigid piles were easily handled and held their alignment even though hard driving was encountered."

Monotubes are chosen on job after job by experienced, economy-minded engineers and builders because they reduce costs . . . save time *Their fluted, tapered design speeds driving. They're easily extendible, right on the job. Tubular construction makes inspection, before concreting, quick and easy. Light in weight, they are easily and quickly handled. Their sturdy construction eliminates use of driving mandrel.*

Available in gauge, size and taper to meet varying soil conditions. For complete information, write The Union Metal Manufacturing Co., Canton 5, O.



UNION METAL

Monotube Foundation Piles

The NEW NO-CREEP RAIL ANCHOR

Solves Maintenance Problems of Railroad Men

Progress is the inevitable result of investigation. All we ask is that you investigate and compare.

When *economy* and *sound business practices* are applied, "two-way" anchors will be considered. Why buy two anchors to accomplish what one "two-way" anchor will deliver?

While eliminating maintenance, this anchor insures an incomparably safer and better track. It remains constantly engaged through the years without attention.

1. **Anchor maintenance eliminated**
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3. **No adjustments . . . cannot get out of adjustment**
4. **Low first installation cost**
5. **Does not nick rail in event of derailments**
6. **Rail spike is retained in wood . . . cannot work up**
7. **Cannot be abused during installation**
8. **Simple, easy installation**
9. **All installations have equal compression and work in unison**
10. **UNIVERSAL: This two-way anchor is applicable to any weight of rail or design of tie-plate and is JUST AS EFFECTIVE ON RELAID, WORN RAIL AS ON NEW RAILS**

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CONCRETE Barrel Shell Roofs provide large column-free areas

CONCRETE barrel shell roofs are ideal for buildings requiring large interior areas free from obstructions. This type of construction offers these distinct advantages:

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2. Maximum usable floor space.
3. Adaptability to a variety of plan requirements.
4. Unusual economy in large structures.
5. Firesafety, low insurance and long life.

This design was chosen for the New York City Fire Department's new repair shops (shown above) in Long Island City, N.Y. The central interior portion of the building has an unobstructed area, 121 x 490 feet, with 35-ft. clearance from floor to crown of roof. Side walls are 12 ft. high at the springing line.

Along both sides of the structure are two full-length lean-to's, spanned by 39-ft. concrete barrel shell roofs. These lean-to's provide space for woodworking, foundry, upholstery and other shops. At the ends of the building, two-story conventional beam and slab type sections for office and storage space complete the structure that was designed by the Bureau of Architecture, New York City Department of Public Works, and erected by Corbetta Construction Co. Roberts and Schaefer Co., Chicago, were the engineers.

The exterior rib construction makes possible a smooth interior ceiling. At the crown the roof is only 3¾-in. thick.

Wherever large, column-free floor areas are essential—such as in train sheds, railroad repair shops, warehouses, auditoriums, airplane hangars, sports arenas and gymnasiums, produce markets, big garages and monumental buildings—concrete barrel shell roofs are the economical answer.

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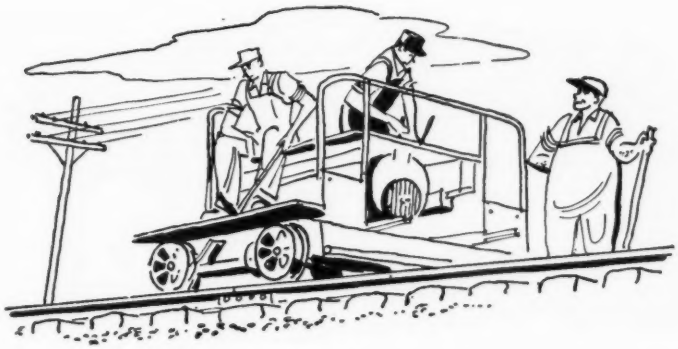

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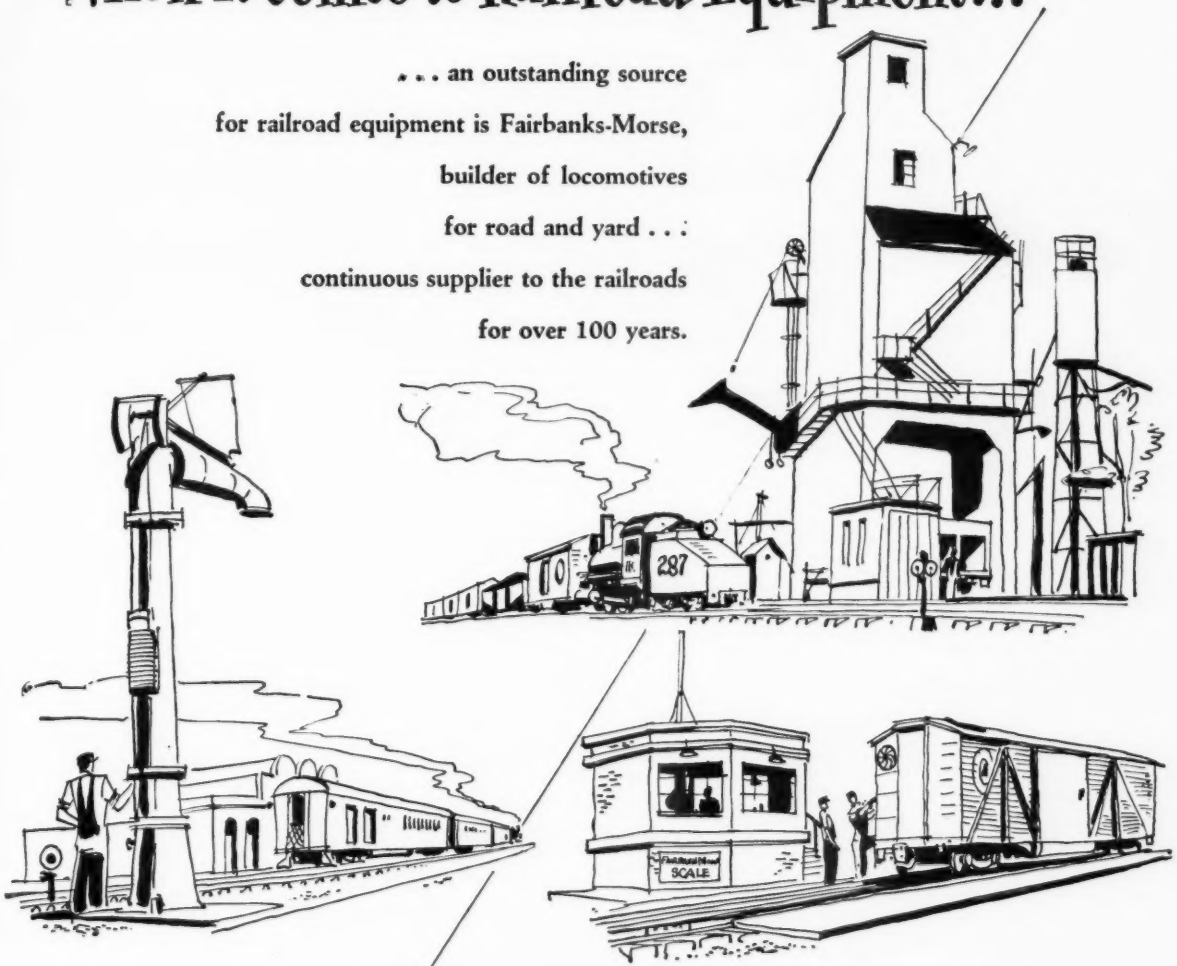
builder of locomotives
for road and yard . . .
continuous supplier to the railroads
for over 100 years.



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IT'S A WORLD BEATER COMBINATION

A POSITIVE MEANS OF ACHIEVING UNPRECEDENTED LOW COSTS IN TRACK MAINTENANCE

THE REVOLUTIONARY JACKSON M-T FOR MAJOR LIFTS

Hundreds of miles of track have now been put up with Jackson "M-T's" and their performance records, from the standpoint of low costs, permanence and absolute uniformity of track, is literally amazing. One man operating 12 vibratory tampers simultaneously does the job in one operation. No smoothing or follow-up is necessary and "the track stays put!" Working in tandem, two of these machines will usually double the daily footage without materially increasing the gang ahead of the machines. Rock ballast, gravel and light ballast are handled equally well.

+ STANDARD JACKSON TAMPERS for SECTION GANG OPERATIONS

The productivity of your section gangs on spot tamping, skeletonizing and on such out-of-face or surfacing work as is usually done by section gangs, reaches its zenith when they are equipped with Jackson "LO" vibratory tampers and power plants. Jackson 4-Tamper plants are also widely used in extra gang service to excellent advantage by combining two or more outfits. The ability of the above combination of equipment to drastically lower track maintenance costs is mighty well worth your careful investigation. Drop us a line for complete information.

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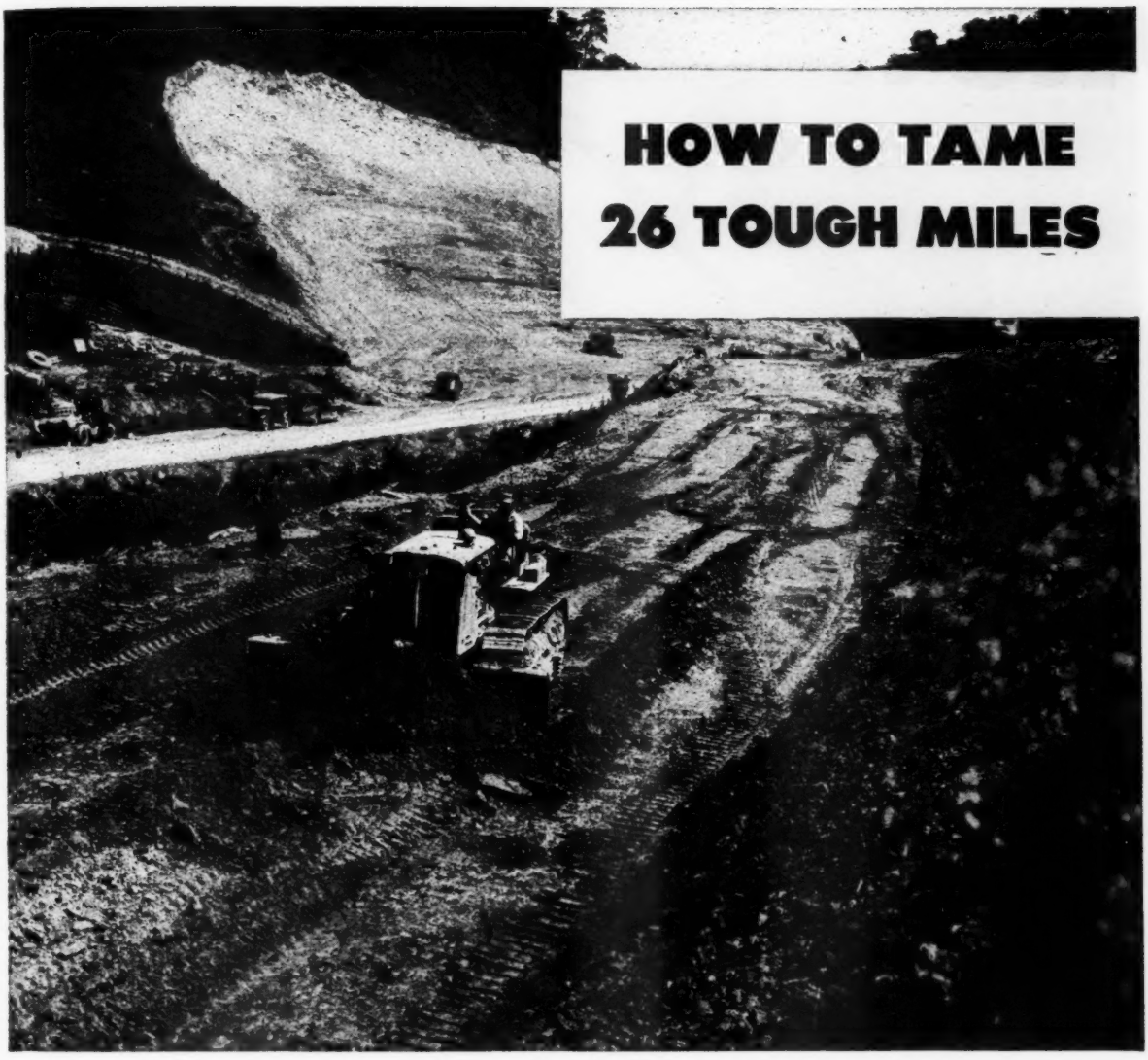
Ludington, Michigan



HOW TO TAME 26 TOUGH MILES

More than 50 pieces of "Caterpillar" Diesel equipment—tractors, motor graders, power units and engines for shovels—teamed together to help tame the 26-mile stretch between Wayland and Deane, Kentucky, on a C. & O. Ry. Co. extension. The Codell Construction Company, Inc., Winchester, Ky., were the contractors.

Here you see a "Caterpillar" Diesel D8 Tractor equipped with a "Caterpillar" No. 8S Bulldozer rough-grading at the bottom of a 175-foot cut, typical of the rough terrain along the line. There were about 500,000 cubic yards in the cut, and "Caterpillar" Diesel power moved the lion's share of it with a minimum of waste motion, time and cost. That's coming through on every count!

It's common knowledge that no matter how tough the going is, everything's under control with "Caterpillar" Diesels on the job. Little wonder they're standard equipment on all kinds of railroad earthmoving from Maine to California.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

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DIESEL ENGINES • TRACTORS MOTOR GRADERS EARTHMOVING EQUIPMENT

now

CLEAN FLANGEWAYS of snow and ice EASIER and FASTER!

THE new Woolery Flangeway Cleaner applies modern power to the age old problem of removing snow and ice from flangeways. Now the old, slow, expensive methods of cleaning flangeways at crossings and alleyways are made obsolete. With the Woolery Flangeway Cleaner you can remove snow and ice as fast as a man can walk. You do the job faster, better and easier. At the same time you cut your maintenance costs and provide greater operating safety by always having clean flangeways.

In operation, the Woolery Flangeway Cleaner can be moved along just outside or inside of the rail. The circular steel cutter, with hardened cutting edges, is lowered into the flangeway. A guide, which serves as a depth gauge, is adjustable from 1¼" to 3¼" depth, and keeps the cutter in proper position. As the unit moves along the rails, a heavy steel guard deflects the snow and ice away from flangeways and operator.

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Write today for specifications on the Woolery Flangeway Cleaner. Prompt Delivery.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

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RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

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MECO LUBRICATOR TYPE MBJ

All MECO parts subject to wear are interchangeable for standard rail sections of all sizes.

Servicing is simplified. The large grease tank requires filling only one-quarter as often.

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Lubricant passages are machined throughout, resulting in uniform flow of rail and flange lubricant.

The improved MECO LUBRICATOR may be changed to other rail sections at small cost for parts.

★ **Maintenance Equipment Company** ★

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"The World's Worst Railroad"

★ How Sperry Research Contributes to Railroad Safety

IS DEDICATED TO GREATER RAIL SAFETY

Five hundred yards of typically defective rail runs close to the Sperry plant. It is the Sperry Rail Service research track, and is laid with defective rails selected from the hundreds of thousands of miles of track tested by Sperry Detector Cars.

Every type of rail defect, big and small, is represented...transverse defects...engine burn fractures...vertical and horizontal split heads ...shelly rail and flowed rail.

On this, the "world's worst railroad," new operators of Sperry Detector Cars are trained... equipment is checked and rechecked for accuracy. The perfect combination of highly skilled technicians and sensitive equipment is achieved.

This is but one aspect of Sperry's research, dedicated to helping America's progressive railroads achieve the best in rail safety through the best in rail testing.

REMEMBER

Only Sperry consistently detects small transverse defects.

Only Sperry consistently detects longitudinal defects.

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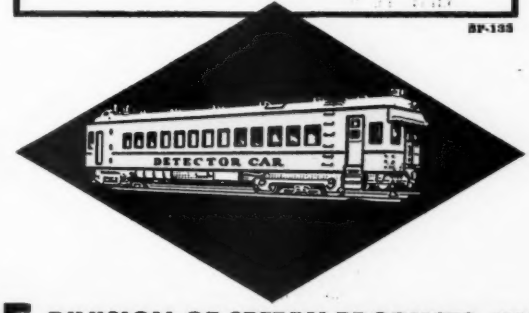


SPERRY RAIL SERVICE DIVISION OF SPERRY PRODUCTS, INC. DANBURY, CONN.

No. 238 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO 3, ILL.

Subject: Our Shoulder to the Wheel

October 1, 1948

Dear Readers:

In this issue we bring you a comprehensive report of the Roadmasters' Association convention held in Chicago on September 20-22. Our November issue will give you similar coverage of the concurrent convention of the American Railway Bridge & Building Association. Then we hope to catch our breath.

Unless you have been a higher officer in one of these associations or an editor on our staff, you really can't know the amount of thoughtful effort that necessarily goes into making these conventions a success and into reporting them fully in our pages—in fact, into carrying on a number of the important activities of the associations during the year.

Since its first issue in 1916, Railway Engineering and Maintenance has thrown its full support behind both the Roadmasters' and B. & B. groups and the supply companies affiliated with them. Yearly, we have given extensive publication to their activities before, during and after their conventions. Some of us have cooperated in preparing the convention programs from year to year. Others have practically taken over at the behest of presidents and carried through all convention hotel arrangements—in an effort to serve the associations and lessen the burden on their officers.

Those of you who receive copies of the annual Proceedings of the Roadmasters' and B. & B. Associations might be interested to know that for a number of years both of these volumes have been compiled by members of the staff of Simmons-Boardman, even to the solicitation and handling of most of the advertising. Furthermore, with the full authority of both associations, we have for many years previewed all technical committee reports prior to their presentation and, at our own expense, have preprinted them for general distribution at the conventions.

As an added service to members and to the supply companies exhibiting during conventions, we have for many years published the complete registration at both conventions—in recent years in a 5 1/2-in. by 8 1/2-in. pocket-size Daily. During the recent conventions about 800 of these Dailies were distributed each morning before the opening sessions.

Now we wind up our convention activities with comprehensive reports of both annual meetings—practically turning over this issue to reporting the Roadmasters' convention and the November issue to the B. & B. convention. We hope you approve of this plan, as bringing to you the most timely and important information available at this time.

Many years ago we set out to render this kind of service to the Roadmasters' and Bridge & Building Associations, and to all of you who are interested in their activities. We continue it gladly, and the more willingly because we realize that it serves you as you are not served by any other publication.

Sincerely,

Neal D. Howard
Editor

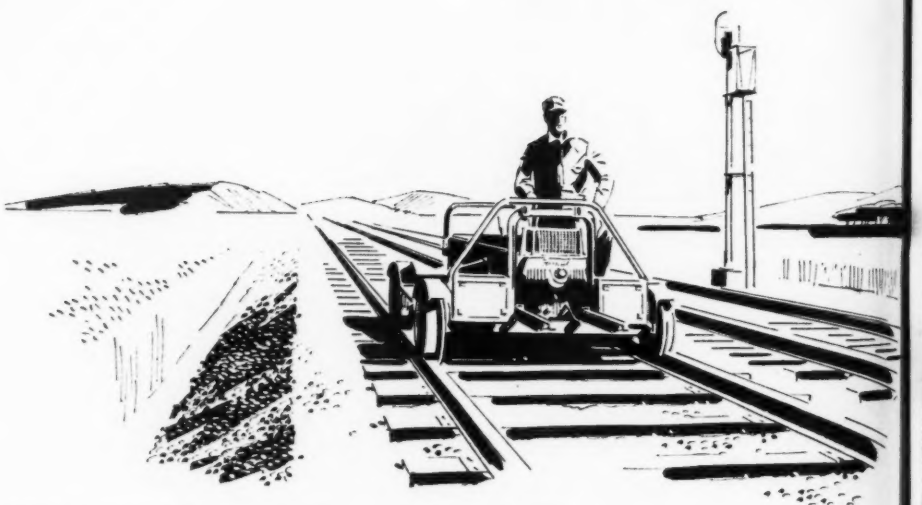
NDH:ag

Fairmont

standard

of service

for the world of rails



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Performance
ON THE JOB
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Railway Engineering and Maintenance

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OCTOBER, 1948

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Railway Engineering and Maintenance

The "Will to Work"—

An Essential to the Well-being of Every Employee

At a time when so much is being said on the railroads and in other industries about the high cost of labor, lower productivity per man-hour, featherbedding, and the unreasonable claims from some quarters for compensation for time not worked, it is important to give consideration to the long-term effects of such factors upon the welfare and security of our country, the future of the American system of free enterprise, and the well-being of every worker and his family.

In any country, and even community, standards of living and the welfare of the people are raised only as production increases and workers are allowed to share equitably in the fruits of their increased production. Increased production, in turn, is predicated upon a "will to work" on the part of every able-bodied person, and a willingness to adopt technological improvements and large-scale production methods.

Everywhere in the world today peoples are backward or are suffering because they have neither the machines to produce nor the proper will or incentive to work. And what is true of nations is equally true of competitive industries—and especially closely regulated industries like the railroads. Production per unit of man-power must be high if the railroads are to be strong and prosper, if railroad jobs are to be secure, and if the welfare of employees is to reach the highest level.

In the light of the importance of the "will to work" it is salutary to note from time to time the profoundly sound advice given to the members of his union by President T. A. Carroll of the Brotherhood of Maintenance of Way Employees in the President's page of the brotherhood's Journal. Mr. Carroll's dominant interest, as it should be, is in the long-term overall welfare of members of the brotherhood. But, knowing that the welfare of his group depends upon the will of its members to work, and upon fair dealing with its industry, he preaches, as Shakespeare wrote, "To thine own self be true, and it must follow as the night the day, thou canst not then be false to any man."

Mr. Carroll wants favorable wage and working conditions for those he represents, but with sound statesmanship he realizes, and does not hesitate to make crystal clear to his associates, that there can be neither favorable wages nor favorable working conditions unless there is a sound national economy, a sound free government under our constitution, and a sound system of private free enterprise in which there is complete understanding and good will between employer and employee. True to themselves—yes—but he makes it unmistakably clear that employees cannot be true to themselves unless they are true to the fundamentals of democracy, true to the precepts of the American constitution, and honest with their employers.

Striking at the philosophy all too prevalent today of "the employer be damned," and less and less production per man-hour, Mr. Carroll said in his President's page in the October, 1947, issue of the brotherhood Journal—"As wage earners, we also have a responsibility to our employers. By performing our duties with a true sense of the privilege to exhibit our skill, we in turn permit the employer to evaluate properly our services. While we expect a fair return for our labor, we likewise must permit our employer to expect a fair return on his investment."

And hitting a high point in labor statesmanship, and at a time when it is urgently needed, not only in the railroad industry, but in industry generally, he urges the "will to work" in his message in the August, 1948, Journal. Deprecating the often-expressed hope of fathers "that their

children would not have to endure the same hardships they faced on their way up," he says, "We have never heard of anyone being hurt or destroyed by honest toil"—"The surest way to destroy democracy," he admonished, "is to destroy the 'will to work.'"

"When you go home at night," he said, "don't you feel a lot better if you can look at yourself in the mirror with a clear conscience and a wholesome feeling and knowledge that you did an honest day's work, and resolve that tomorrow you will try to do even more for yourself, your family, your employer and your fellow man? Do nothing to destroy incentive, but do everything in your power to encourage it."

What timely advice when so many on the railways—not only in Mr. Carroll's brotherhood, but in other groups as well—have lost sight of the fundamental importance of the "will to work" to the welfare of their country, their industry, and themselves individually.

The Conventions—

What Did You Get Out of Them?

SUPERVISORY officers who attended the Roadmasters' and Bridge and Building conventions at Chicago last month have long since returned to their jobs, and presumably are putting into practice many of the things they learned. Or are they? This is an important question, for the answer given by a particular individual will be the tip-off on whether he was merely a statistic at the convention, helping to swell the registration, or was there to absorb information with the intention of putting it to practical use later.

Every committee report presented at the two meetings was a gold mine of useful information, and some of them contained conclusions or recommendations summing up the committee's findings. Supplementing this wealth of data was the lively discussion that followed the presentation of nearly every report, bringing out additional ideas or practices that have proved their worth on particular roads. The addresses, too, gave up a fund of information for those who were there to seek it—and the manufacturers' exhibit revealed the latest in materials and equipment.

It is hardly to be expected that anyone will remember more than a fraction of the information contained in the reports and addresses. What may be expected, however, is that individuals, as they were listening, would make mental or actual notes of statements considered of particular interest or value to them, especially of statements that seemed to offer ideas for improving methods or practices on the home railroad.

Suppose each of the men in attendance at the meetings were now to ask himself this question: Did I bring away any ideas on which I plan to take definite action? If this question cannot be answered in the affirmative the chances are that he was not making the best possible use of his time while attending the meetings.

After considering the matter from this point of view many of those who attended the Roadmasters' convention will want to re-read the committee reports as presented elsewhere in this issue. Bridge and building men will be given a similar opportunity in the November number. For officers in both categories who were not able to attend the meetings, careful reading of the convention reports is a "must".

Supervision—

How Much Should Track Gangs Have?

OBSERVERS who have traveled widely over various roads report that there is considerable disparity in the amount and kind of supervision that is accorded track gangs on the different lines. The question naturally arises as to how much supervision gives optimum results. In view of the high costs of labor and materials, no question facing maintenance-of-way departments today is more important than this one.

While the complexities of the problem are too great to permit its being given complete treatment in a brief discussion, one thing seems certain—where moderate to extensive maintenance operations are being carried out, requiring the coordinated efforts of several gangs, it would seem to be hardly sufficient to organize the various units and then practically leave them to their own devices under their respective foremen. However, this seems to be exactly what is happening on some roads.

Where several units or gangs are involved it would almost seem mandatory to have someone present—either a general foreman or higher supervisory officer—who has authority to coordinate the efforts of the several gangs and to put into effect whatever adjustments may seem necessary in order to make the most effective use of the man-power, the machines, and the time available. In the absence of such supervision, any number of untoward happenings can occur, as many track men have found through hard experience. One gang may lag behind and delay others, causing idleness of both men and machines in the other groups. There may be inefficiency and waste in the use of work-train service or, in the absence of immediate supervision, the individual foremen may lose sight of the relationship of their work to the operation as a whole.

Where the gang involved consists of only one unit there would seem to be little need, except in unusual situations, for continual supervision other than that of the foreman. However, such gangs should be visited at intervals by the roadmaster or the supervisor to keep them on their toes. In the words of J. H. Aydelott, vice-president, Association of American Railroads, speaking before the Roadmasters' Association, last month, these visits should occur "at times when they are not expecting the supervision to be near."

There are situations in which supervision that is too close and too nearly constant will discourage initiative on the part of the foreman and his men. However, in some cases, as mentioned above, continuous supervision, largely for the purpose of coordination, is necessary if the maximum possibilities of the man-power and machines are to be realized.

Below—2:46 p.m.—Looking west at the beginning of the moving operation. The old bridge, shown at the right, was still in its original position, while the new structure, at the left, rested on falsework. Right—3:05 p.m.—This view, taken after completion of the moving operation, shows the old bridge at right, supported on falsework, and the new structure in position on the piers and abutments

On a recent five-span bridge-renewal job on the New York, Chicago & St. Louis, an ingenius method, involving the use of a system of rollers and a block-and-tackle arrangement, was devised for shifting the new structure into place on the existing substructure simultaneously with the moving of the old bridge onto falsework bents. So effectively was the operation carried out that the complete transfer of four spans, totaling 596 ft. in length, was effected in 19 min. The details of the new and old structures, along with the method and equipment employed in this work, are described in this article.

New and Old Bridges Shifted in One Operation On the Nickel Plate

A CLEVER scheme for shifting the new superstructure of a multiple-span bridge laterally into position simultaneously with the displacement of the old superstructure characterized a recent bridge job on the New York, Chicago & St. Louis. This project involved the renewal of three 158½-ft. Pratt deck-truss spans with three 158½-ft. Warren deck-truss spans, a 55-ft. deck-plate-girder approach span at one end, and a 59-ft. approach span of similar construction at the other end. Having first erected the new span on temporary double timber bents along one side of the old bridge, and having placed similar bents along the opposite side of the bridge, the two structures, except for one of the approach spans, were moved laterally in unison on rollers by a block-and-tackle arrangement, the pulling power being furnished by a locomotive crane located at one end of the bridge.

After completion of this operation, which required only 19 min., the three trusses and one approach girder of the new bridge were in place on the existing substructure while the comparable spans of the old bridge rested on the temporary bents alongside in position for dismantling. Before the moving operation began, the other old approach span was lifted out by the locomotive crane to avoid the possibility of the structure binding while the moving process was under way, and the new approach girder at this end was lifted into position by the crane after movement was completed.

The bridge involved in this project, situated in a general east-west direction, is located at Mackinaw Dells, Ill., where it carries a single track over the Mackinaw river. The line in this vicinity, while on a level grade over the bridge, descends on long 0.7 per cent grades in both directions to the structure, and, at the east end, extends out on it for 102 ft. on the spiral of a 3-deg. 38-min. curve. All of the spans, however, lie in a straight line.

The old structure, built in 1895 and designed for Cooper's E-30 loading, was not adequate for modern speeds and loads. As a result, it was neces-

sary to maintain a slow order of 25 m.p.h. over the bridge in a territory where speeds of 55 m.p.h. for passenger trains and 45 m.p.h. for freight trains are permitted. Also, the light capacity of the bridge did not permit the double-heading of trains that was frequently desirable for efficient operation on the 0.7-per cent grades at the ends. Furthermore, the spans had been strengthened by welding to the point where further work of this kind was not considered economically justified. For these reasons it was decided to renew the entire superstructure with a stronger structure.

The plans for the new bridge, based on Cooper's E-60 loading, were predicated on the reuse of the existing stone masonry piers and abutments, all of which were in good condition, and the raising of the grade line across the bridge 1 ft. 8 in. However, since it was desired to maintain the substructure at its existing height, the track raise on the bridge was accomplished by deepening the new spans. To solve the problem of providing the necessary super-elevation for the spiral at the east end of the bridge, the new east approach girder span was designed with a ballasted deck.

The assembly of the new trusses was carried out at a temporary spur track installed about 900 ft. west of the bridge. After assembly they were moved, one at a time, by two cranes into position on the temporary bents which had been constructed in the meantime on the south side of the existing bridge. With the trusses resting on a series of rollers on the temporary bents, the floor system and bracing was installed, the fabrication of the new spans was completed and the ties and rails were applied. The east girder approach span was also placed on the temporary bents, the concrete deck poured and the ballast, ties and rails installed. In preparation for the moving operation the old structure was raised a foot on blocking, and suitable track runoffs were constructed at the ends. When this had been done there was still an 8-in. difference in the base-of-rail elevations of the two bridges.

The temporary bents constructed on the south side of the bridge for supporting the new spans prior to placement were situated at each of the four piers and at the east abutment. For receiving the old spans similar bents were constructed on the north side of the bridge at the same locations. Such bents were not required at the west abutment because the approach span at this end was to be renewed by lifting with a locomotive crane.

At each of the piers and the east abutment the temporary bents north and south of the bridge, together with the unit of the substructure between them, formed a support for a continuous roller track. Each of these tracks, except that at the east abutment, consisted of four parallel lines of rails, bolted together, which were supported on the bents and masonry by blocking. Rollers were placed on these tracks underneath the new spans, and also under the old structure. On top the rollers at each location were four lines of inverted rails forming a unit which acted as a continuous bridge seat for both the old and new superstructures.

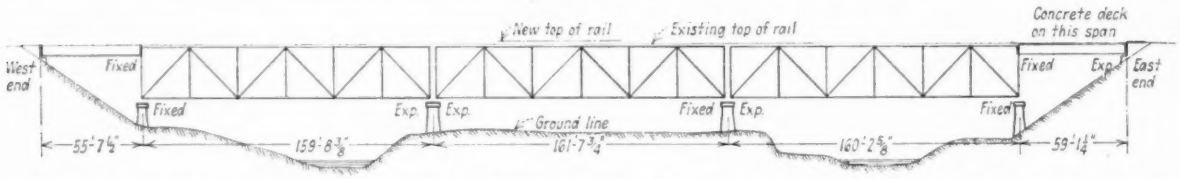
The roller-and-track arrangement at the east abutment was the same as at the piers except that only three rails were used above and below the rollers instead of four. The rollers, 2½ in. in diameter, were placed 15 in. apart in frames 6-ft. long. Hubs at the ends of the rollers fitted into slots in the angle iron guides that formed the sides of the frames. When placed in position the ends of adjacent frames were spliced together.

The Pulling Arrangement

For pulling the new and old spans simultaneously on the rollers, a seven-part block-and-tackle set, with ¾-in. cable, was used at each of the four piers and the east abutment. At each pier one sheave of the block and tackle was fastened to the south truss members of the new spans and the other sheave to a "deadman," consisting of a cluster of piling driven for this purpose north of the north-side falsework bents. The cable between the sheaves passed under both bridges. A similar hookup was made at the east abutment, with one sheave fastened to the south girder of the new span. The fastenings were made in such a way that the pull was exerted at the bottoms of the vertical end posts of the trusses and at the bottom flange of the girder. Blocking was placed between the old structure and the new so that the pull of the cables would cause them to move together.

This setup for moving the spans required five block-and-tackle sets. The lead line of each was carried along the north side of the north falsework bents to the west end of the bridge where all five lines were joined together in a ring. The ring, in turn, was then connected to the drum of a locomotive crane with a five-part block-and-tackle set. Before the actual pulling operation began each of the five lead cables was pulled taut and adjustment made at the ring so as to minimize slack and stretch in them.

On the day that the spans were moved, the pulling power at the crane was applied at 2:46 p.m. The pull was maintained continuously until 3:05 p.m., at which time the new spans were in place on the old substructure and the old spans were resting on the falsework bents north of the bridge. The movement was accomplished without throwing the track on the new spans out of line more than ⅜ in. to ½ in. at any point. These minor imperfections in line were subsequently adjusted by jacking.



Elevation of the bridge. In the moving operation a block-and-tackle set was used at each of the four piers and the east abutment

Immediately after the new spans were in place, the new west approach girder span was set in place by the locomotive crane and a gang of trackmen proceeded to give the track approaches the final 8-in. raise required to bring them up to the new bridge grade. Meanwhile the rollers were removed from beneath the spans and the bridge shoes were seated on the old bridge seats which had been built up with Embeco. All of this work was completed and the bridge restored to service by 6 p.m. The old spans were dismantled and sold for scrap.

This project was carried out under the general direction of J. C. Wallace, chief engineer, New York, Chicago & St. Louis, assisted by R. T. Blewitt, bridge engineer, who was in charge of the design and execution of the work. The moving operation was carried out under contract by the Ferro Construction Company, Chicago, under the supervision of R. E. Oberdorf, division engineer. The span-moving scheme as described in this article was devised by H. B. Sierts, president of the construction company.

Twelve precast concrete piles, driven to a firm bearing, support this new Atlantic Coast Line 50,000-gal. tank

Concrete Piles for This New Water Tub

THE Atlantic Coast Line recently placed in service a new 50,000-gal. wood water tank at Warsaw, N. C., which is of special interest because the floor consists of a reinforced concrete slab and the substructure is of precast concrete piles. The tank is circular in shape and is 24 ft. in diameter and 15 ft. 11 in. high above the floor.

Warsaw is located on the main line of the Atlantic Coast Line between Richmond, Va., and Wilmington, N. C. A branch line extends from Warsaw to Clinton, N. C. Formerly there were two water stations, one located just south of Warsaw on the main line and the other on the branch line. The new water station was constructed to replace both of the old facilities.

In planning the new station, it was found that considerable difficulty would be encountered in obtaining the proper type of treated timber in sufficient quantity to build the substructure and floor of the tank in accordance with the Coast Line's standard design for such tanks. Accordingly, the road decided to make use of some 13-in. square concrete piles, which were on hand, for the substructure and to cap the piling with a poured-in-place beam-and-slab floor.

The piles, 12 in number, were driven to a firm bearing and were cut off at a height of 14 ft. 2 in. above the top of rail. They were driven in three rows of four piles each. These rows, parallel to the track, are 7 ft. 9 in. apart and the piles in each row are 5 ft. 2 in. apart. The tops of the piles in each row were encased in a cap or floorbeam, and these beams were joined by a transverse beam at each end. The beams were cast integrally with the floor slab, which is 12 in. thick and octagonal in plan, with the distance between opposite faces being 25 ft. The perimeter of the slab is mortised to form a ledge for supporting the staves of the tank.

The tank proper is of cypress, and is fitted with a standard 10-in. tank spout. A 10-in. pipe line runs from the tank to a Mansfield rigid water column located 585 ft. south of the tank. This arrangement enables locomotives of passenger trains in both directions to take water while station work is being done—northbound trains using the spout at the tank.

Concrete paving was installed in the area beneath the tank and between the tank and the track, including a side ditch. This feature gives the facility a more attractive appearance, in addition to preventing the growth of weeds.

Water for this station is drawn from a 10-in. diameter well, 165 ft. deep, and is pumped to the tank by a Pomona turbine deep-well pump operated by a 7½-hp., 220-volt, 3-phase motor. The pump has a capacity of 100 g.p.m. and is fully automatic in operation. The pumping equipment is located in a concrete-block house, 10 ft. by 22 ft. in plan with concrete floor and roof.

As stated, the substructure piles used on this job were already available, having been cast some years ago for another job. If a similar installation should be made in the future, the company expects to use its standard 18-in. octagonal reinforced concrete piles, redesigning the concrete floor slab accordingly.

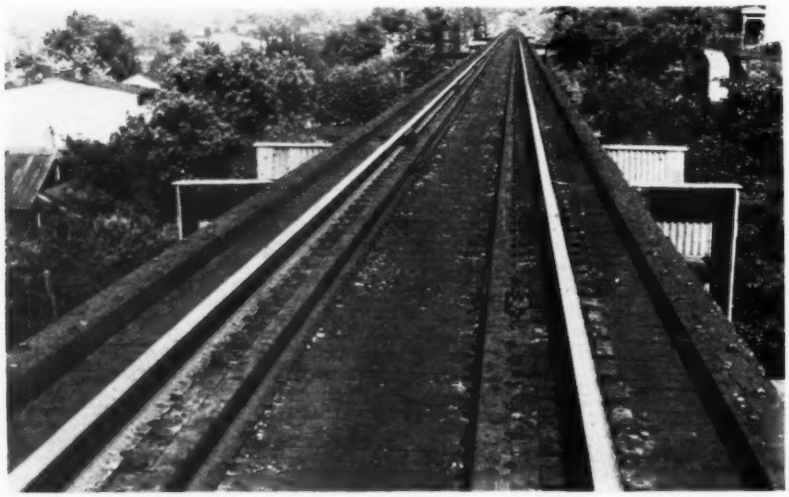
The new water station at Warsaw was designed and built under the general direction of R. L. Groover, chief engineer of the Atlantic Coast Line, Wilmington, N. C., to whom we are indebted for the information contained in this article. It was constructed under the direct supervision of F. L. Etchison, engineer maintenance of way, northern division, and E. H. Liles, supervisor of water supply of the same division.

Tests Effect on Signal Circuits of CZC-Treated T

TREATED timber has long been recognized as one of the most economical construction materials for railroad bridges, and has given excellent service in various types of bridge construction. Originally, the treatment for such timber was designed alone for the purpose of protecting it against decay and insect attack, and this protection, as imparted by pressure treatment with creosote and creosote-coal tar solutions, has proved adequate and satisfactory. Since the beginning of the wood-preserving industry, there has developed an increasing demand for the protection of wood against fire. This is of particular significance where railroad bridges are concerned, since bridge fires can present a serious operating handicap. Many bridge fires start as a result of hot coals or heated particles of metal from brake shoes falling on the ties.

The Chesapeake & Ohio was emphasizing protection against fire as well as decay and insect attack, when it modernized its bridge No. 25 near Cincinnati, Ohio. To combat fire hazard, pine bridge ties were installed which were pressure treated with 1 to 1½ lb. per cu. ft. of chromated zinc chloride. On approximately half of this bridge, 3-in. by 4-in. by 10-ft. filler blocks, also treated with chromated zinc chloride, were installed between the ties. This made a solid deck of fire-retardant treated wood, which prevents any hot coals or particles of metal from falling through to the creosoted structure below. The section of the deck containing filler blocks was further protected by the application of Koppers Clear Non-Flammable sealer, which retards leaching of the chromated zinc chloride. To prevent possible spread of fire in the timber approach structure, fire stops made of corrugated Transite on creosoted frames were installed at 125-ft. intervals.

It is planned to add treated filler blocks to the remainder of the structure, and also to apply the sealer to this portion of the bridge. One of the accompanying photographs shows the section of the bridge with filler blocks. Another shows the other end of the bridge, where the filler blocks have not been installed as yet, nor the sealer applied. A considerable amount of checking is noticeable in the ties not protected with the latter material. Both sets have been in service for more than three years.



Two views of bridge No. 25 of the C.&O., which has CZC-treated ties. Section of deck shown above has filler blocks and is covered with a sealer coat. Portion below is without filler blocks or the sealer coat. Note checking of ties in latter section

Tests of Conductivity

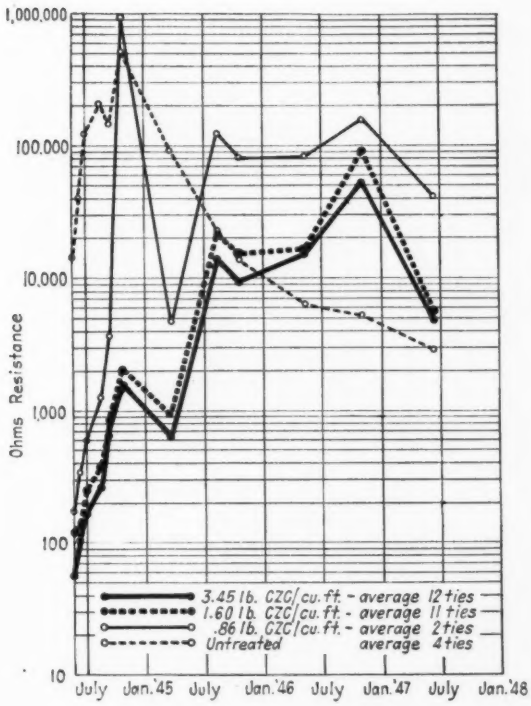
Prior to the time the fire-retardant treated ties were installed in the bridge, consideration was given to the possible effect of the salt treatment on the electrical resistance of the ties, and thus on the track signal system. Consequently a series of tests was started for the purpose of measuring the difference in resistance of various retentions of chromated zinc chloride as compared to untreated ties. In these tests thirty 7-in. by 9-in. by 8-ft. 6-in. southern yellow pine ties were selected from stock and divided into four groups of 12, 12, 2 and 4 ties, respectively. One group of 12 ties was treated with 3 lb. per cu. ft. of chromated zinc chloride. Another group of 12 ties was treated with 1½ lb. per cu. ft. The group of two ties was treated with ¾ lb. per cu. ft. and the group of four was used as untreated controls. All of the ties were treated in the pilot plant of the Koppers Company, Inc., at Orrville, Ohio.

Promptly following the pressure treatment of the ties, standard 131-lb. RE plates, 7¾ in. by 13 in. (18 lb.), were attached with two 9/16-in. by 6-in. cut spikes. There were several variations used in the methods of preparing the ties for the application of the tie plates. Some of the ties were prebored before treatment with 16 holes. In another group of the ties, in addition to standard preboring for the tie plates, each tie was also bored with a ¾-in. hole into both ends for a dis-

Ties for Bridges

By H. M. CHURCH
Consulting Engineer
Richmond, Va.

As a means of protecting timber bridges against fire as well as decay the Chesapeake & Ohio has given consideration to the pressure treatment of bridge ties with chromated zinc chloride. To determine the effect of such treatment on the electrical resistance of these ties a series of tests was made. As a result it was determined that fire-retardant treatments will not be a serious detriment to railway signal systems if a reasonable period for seasoning is allowed after treatment.



Above—This chart shows the variation in resistance of the various groups of test ties. After 18 months all the treated ties were higher in resistance than the untreated controls. Below — Fire stop of corrugated Transite in bridge No. 25 of the C.&O.

tance of 3 ft. 6 in. A third group of the ties was bored after treatment and the freshly-bored holes were treated with a creosote coal-tar solution, using a Superior hole treater. On some of the ties a piece of tar paper was placed under each tie plate. Results of the test showed that the various methods of attaching the tie plates had little or no effect on the electrical resistance of the ties.

How Test Was Made

The final step in making the test installation was to place the ties in a row, side by side, on two lines of sleepers laid on the ground. Electrical resistances of the ties were measured weekly at first by means of a Wheatstone bridge. Later these measurements were reduced to about one every three months. At the time the resistances were taken, the ties were also weighed to check the changes in moisture content. The results of the resistance measurements are shown by the chart, giving the variation of resistance with time.

From the resistance study, the conclusion may be drawn that fire-retardant treatment will not be a serious detriment to railway signal systems if a reasonable seasoning period is allowed after treatment. After 18 months all the treated ties in the test were higher in resistance than the untreated controls, and remained higher. Based on the results of this study, the decision was made to install fire-retardant treated ties in Bridge No. 25. The ties installed had a retention of dry salts after treatment ranging from 1.5 to 1.75 lb. per cu. ft.

The length of the track circuit at this location is 2,200 ft. of which 1,431 ft. is on the bridge. Current flow to track at the battery end is 340 milliamperes; current flow through the relay is 206 m.a.; and the resistance unit is adjusted for 2 ohms at the battery end. Five Edison primary batteries, S-500, connected in multiple, furnish the current for this track unit. The relay is Model 13, rated at 2 ohms, and has 6 points; the recommended working is 0.35 volt and 180 m.a.

No Serious Detriment

Before the fire-retardant treated ties were installed the average life of the batteries was 155 days. After these ties were installed the life of batteries was reduced to 94 days, then increased until it was an average of 147 days 40 months after installation. A series of comparative readings was made on track circuit R4. The length of this circuit is 1,925 ft., of which 1,295 ft. is on bridge No. 19, where the ties are treated with creosote-coal tar solution. The average life of batteries on this particular bridge circuit is 180 days.

Thus, both experimental and actual installations have shown that fire retardant treatment of bridge materials will not be a serious detriment to the electrical systems of the track circuits.

Left—The No. 3-R-30 compressor, as shown here, is capable of operating two standard tamping guns. Below—Showing how the wheelbarrow-type mounting is used for moving the compressor about on the job

Spot Tampers for Section Gangs on the Northern Pacific

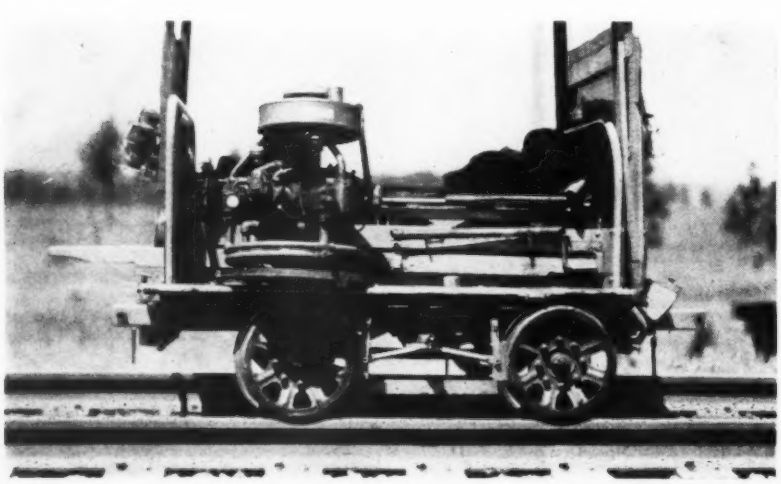
DURING the past three years, in the interest of increasing labor efficiency, and stimulated by a shortage of labor in some localities, the Northern Pacific has been carrying out a program to equip its section gangs in rock-ballasted territory with mechanical spot-tamping equipment, with the result that, at the present time, 185 gangs are so equipped. The program was undertaken with the thought that such equipment would be used exclusively by the section gangs for spot-tamping work, leaving all out-of-face surfacing to be done by extra gangs. Section gangs on this road vary in size from two to eight men.

The spot-tamping equipment now in service on the Northern Pacific includes 65 of the new Ingersoll-Rand 3-R-30 Spot-Air compressors*, the first shipment of which was received in May, 1947. Each of these units is operated by a three-cylinder, four-cycle radial gasoline engine, has a rated capacity of 30 c.f.m. at a working pressure of 80 p.s.i., and is capable of operating two standard tamping tools. Each unit is mounted on a circular steel base 22 in. in diameter, and has an overall height of 27 in. Weighing 225 lb., the complete unit can be readily lifted by two men using a bar inserted through a collar in the frame of the machine. A detachable wheelbarrow-type carriage, with hooks to engage the lifting bar, is available for use with this compressor, and all those in service on the Northern Pacific are so equipped.

*A detailed description of this compressor was published in issue of March, 1948, page 299.

The compressor alone, detached from the wheelbarrow mounting, can be transported on the tool tray of a standard section motor car. The practice on the Northern Pacific, where motor cars operate on line-ups, is to transport the compressor back to headquarters upon completion of each day's work, leaving the wheelbarrow carriage, tamping tools and hose at the job site overnight. Sufficient fuel (standard first-structure gasoline not mixed with oil) for each day's operation is carried in cans.

At the time a Spot-Air compressor is assigned to a section gang a traveling roadway equipment mechanic from the organization of the supervisor of work equipment is on hand to "break in" the equipment and instruct the section men in its proper use and maintenance. Thereafter, the mechanic, who covers his territory in a panel-body truck, is called upon, whenever necessary, to make field repairs that cannot be handled by the section men. If the condition of the machine is such that shop repairs are necessary, it is sent to the work-equipment repair shop at Livingston, Mont. A definite system for making periodic inspections and repairs has been developed.



Showing how the compressor is transported on the tool tray of a section motor car

Roadmasters' Section

"Keep Up With Times" Is Theme of Annual Meeting

Convention at Chicago, held concurrently with that of Bridge and Building group, has record attendance. Success enhanced by large exhibit and the Railroad Fair

A. B. Chaney
President,
Roadmasters' Association

PERMEATING the convention of the Roadmasters' and Maintenance of Way Association at the Stevens hotel, Chicago, on September 20-22, was the thought that conditions are changing rapidly and that maintenance-of-way supervisors must keep their thinking in step with the new conditions. This thought kept cropping up in the addresses, in the committee reports and in the discussions following their presentation, and may be said to constitute a theme or keynote that dominated the entire meeting.

Why Meeting Was Success

The fact that this meeting was an outstanding event may be attributed to a combination of factors. For one thing it was the third consecutive convention of the Roadmasters' Association to be held concurrently with that of the American Railway Bridge & Building Association. Another was the display by 93 manufacturers of a wide range of materials, equipment and appliances in the large exhibit hall of the hotel, which, undoubtedly, brought many railway men to Chicago at this time. Still another was arrangements by 13 committees of the American Railway Engineering Association to hold meetings in Chicago during the conventions, in order to be able to attend specific sessions of the conventions and the railway supply exhibit.

Contributing in some measure to the success of the meeting was the presence of the Railroad Fair on Chicago's lakefront. In fact, instead of the usual inspection trip to a manufacturing plant, which has been a regular feature of each of these conventions for many years, the final afternoon of the three-day period was left open to give those present an opportunity to visit the Fair. Enhancing the importance of the occasion was the fact that Wednesday, September 22, had been designated as "Roadmasters' and Bridge and Building Supervisors' Day" at the Fair.

The combined attendance at the two meetings, totaling 900 members and guests, established a new high record since the practice was started of holding these meetings concurrently. This figure compared with a total registration of 765 members and guests in 1947 and 693 in 1946.

A detailed account of the Roadmasters' sessions, and of various joint activities of the two groups, is given in this article and following pages. The November issue will contain a similar account of the activities of the Bridge and Building Association.

Joint Opening Session

The two meetings were convened in a joint opening session on Monday, September 20. Presiding jointly over this session were A. B. Chaney, assistant engineer maintenance of way, Missouri Pacific, and president of the Roadmasters' Association, and J. S. Hancock, bridge engineer, Detroit, Toledo & Ironton, and president of the Bridge and Building Associa-

tion. Messrs. Chaney and Hancock also presided jointly over a common session held on Tuesday afternoon. All separate sessions of the Roadmasters' group were directed by Mr. Chaney, assisted by R. L. Fox, division engineer, Southern, and first vice-president of the association.

As the first item of business at the opening session, words of greeting were extended by C. H. Mottier, as president of the American Railway Engineering Association, by J. B. Templeton, as president of the Track Supply Association, and by Howard Mull, as president of the Bridge and Building Supply Men's Association.

R. L. Fox
First Vice-President

Neal D. Howard
Second Vice-President

E. E. Crowley
Treasurer

Also, Lewis Thomas, secretary of the Track Supply Association, explained the background of the extensive display of manufacturer's products that had been arranged in the hotel's exhibit hall jointly by the Track Supply group and the Bridge and Building Supply Men's Association.

The joint opening session was closed by an address by J. H. Aydelott, vice-president, Operations and Maintenance department, Association of American Railroads.

President Chaney's Remarks

Immediately after the opening sessions, the two groups separated to begin their individual meetings. In his opening address before the Roadmasters' meeting, President Chaney referred to the past year as a "period of changing values of both labor and material as compared to the dollar value of these items in past years," and said that "this has focused our attention on new methods and devices in our efforts to meet the situation." In effect establishing a theme for the meeting, he went on to say that "few here today can fully comprehend the extent of changes that have been made in track maintenance and materials during the 65 years that this association has been in existence." Enumerating some of the more important developments of the past 25 or 30 years, he said that "these developments have presented many problems to track men, but few will deny that the next quarter century will reveal as many, if not more, changes and problems."

Noting that some of the subjects discussed at the convention in 1923 are still fundamental today, he said that, while a subject may remain basic, the detailed methods and related problems vary from year to year because of new conditions, requirements, and developments. "This necessitates continuous investigation, research, alertness, a desire for improvement and a willingness to work if progress is to be made and sustained."

Stating that interest in association activities had remained at a high level in 1948, Mr. Chaney said that 247 members volunteered to serve on the six technical committees this year as compared to only 111 members volunteering for similar service in 1940. Reporting the results of the membership committee's activities during the past year Mr. Chaney said that more than 200 new members had been added to the rolls since the last convention.

Substance of Program

When Mr. Chaney had concluded his opening remarks the group immediately began consideration of the business at hand, which consisted principally of the presentation and consideration of six technical committee reports and of three addresses on subjects of particular interest at this time. The subjects of the committee reports were as follows: Keeping Power and Spring Switches in Operation During Winter Storms; Use of Work Equipment at Derailments and in Coping with Other Emergencies; Education of Track Employees in the Cost of Materials, Tools and Equipment; Reducing Rail Joint Maintenance; Modern Methods of Controlling Vegetation and Woody Plants; and Functions and Responsibilities of Section Gangs.

The addresses included one by G. L. Sitton, assistant chief engineer, Southern, on Sand Methods of Stabilizing Roadbed; another by G. M. Magee, research engineer, Engineering division, A.A.R., on Rail Joint Bar Design; and a third by J. W. Risk, superintendent of work equipment, Canadian National, on Snow Fighting in Canada.

In addition, two other addresses were presented during the joint session on Tuesday afternoon. One of these was by O. H. Carpenter, general roadmaster, Union Pacific, whose subject was Safety Problems as Affected by Diesel Operation and the Increased Mechanization of Maintenance Work. In the other address, A. E. Perlman, general manager, Denver & Rio Grande Western, spoke on How the Roadmaster and Bridge and Building Supervisor Can Help Hold Down Maintenance Costs.

A special feature of the meeting was the presentation of certificates of honorary membership in the association to Frank R. Layng, vice-president and chief engineer*, Bessemer & Lake Erie, and Armstrong Chinn, president of the Terminal Rail-

*Effective October 1, Mr. Layng retired from active service but retains his connection with the road with the title of consulting engineer.

Roadmasters' Association

Officers, 1947-1948

A. B. Chaney, president, assistant engineer maintenance of way, M. P., St. Louis, Mo.

R. L. Fox, first vice-president, division engineer, Southern, Alexandria, Va.

Neal D. Howard, second vice-president, editor, *Railway Engineering and Maintenance*, Chicago.

Elise LaChance, secretary, Chicago.

E. E. Crowley, treasurer, roadmaster, D. & H., Albany, N. Y.

Directors

A. G. Reese, district engineer maintenance of way, C. B. & Q., Galesburg, Ill.

A. H. Whisler, assistant engineer, Penn., Philadelphia, Pa.

C. Halverson, division roadmaster, G. N., Willmar, Minn.

J. E. Fanning, assistant to chief engineer, I. C., Chicago.

R. H. Gilkey, division engineer, C. of Ga., Savannah, Ga.

H. C. Koch, roadmaster, C. & W. I., Chicago.

F. G. Campbell, chief engineer, E. J. & E., Joliet, Ill.

G. L. Morrison, assistant engineer maintenance of way, S. P., San Francisco, Cal.

road Association of St. Louis. Messrs. Layng and Chinn, and T. F. Donohoe, retired roadmaster, Baltimore & Ohio, were elected to honorary membership at last year's meeting. Mr. Donohoe died during the last year.

An outstanding event of the meeting was a banquet on Tuesday evening, which was tendered to members of the two associations and their families by the Track Supply Association and Bridge and Building Supply Men's Association. A total of 1230 persons attended the banquet, which was held in the Grand Ballroom of the Stevens.

Election of Officers

In the election of officers at the final session of the Roadmasters' meeting on Thursday Mr. Fox was advanced to president; Neal D. Howard, editor, *Railway Engineering and Maintenance,* Chicago, was advanced from second vice-president to first vice-president; A. G. Reese, district engineer, maintenance of way, Chicago, Burlington & Quincy, Galesburg, Ill., was advanced from director to second vice-president; and E. E. Crowley, roadmaster, Delaware & Hudson, Albany, N. Y., was re-elected treasurer. Directors elected were A. H. Whisler, assistant engineer, Pennsylvania, Philadelphia, Pa. (re-elected); and H. W. Kellogg, division engineer, Chesapeake & Ohio (Pere Marquette district), Detroit, Mich.

At a meeting of the Executive committee following the close of the convention six subjects were chosen for investigation by committees during the ensuing year, as follows: Stimulating Interest Among Young Men in Maintenance-of-Way Work as a Career; Preventing the Abuse of Tools and Work Equipment; Developing Good Housekeeping Habits Among Track Employees; Recent Developments in the Transportation of Track Forces and Materials; Economies To Be Gained Through the Proper Distribution of Ballast; and the Relation of Supervision to Maximum Production of Track Gangs.

In 1949 the annual meetings of the Roadmasters' Association and the Bridge and Building Association will again be held concurrently, the tentative dates being September 13-15.

All six committee reports presented during the meeting are published in full in the following pages, together with abstracts of the discussions that followed their presentation. Also included are abstracts of the addresses by Messrs. Aydelott, Magee, Carpenter and Risk. The address by Mr. Perlman will be presented in full in a later issue.

Design of Joint Bars

IN HIS address on the design of joint bars, which was illustrated by slides, Mr. Magee discussed the considerations involved in developing joint bars for the new rail designs that were adopted by the A.R.E.A. in 1946 to supplant the 112-lb. RE and 131-lb. RE rail sections. After briefly discussing the reasons for changing the designs of these sections, Mr. Magee said that the revised designs of joint bars for these sections were the culmination of 10-year service tests of various joint bar designs. Tests on the Pennsylvania and the Atchison, Topeka & Santa Fe were undertaken, he said, to study the influence of length of bar, head free or head contact bearing, controlled or full bearing, toeless or long toe design, and certain special types.

Mr. Magee reviewed the results of these tests and then explained the nature of the changes that were made in the new joint bar design as compared with the former designs. One of the most important changes was the reduction in the lateral stiffness of the head to make it possible to deflect the bar with the applied bolt tension to take up wear. Greater clearance for wheel flanges and other advantages were also realized, he said.

Other changes were made to bring the bar web in as close to the rail web as possible to reduce bolt breakage, and to make the web of the bar as thin as practicable. The purpose of the latter change, said Mr. Magee, was to secure "springiness" in the vertical direction in order to add to the reactance of the spring washers and to assist in maintaining bolt tension as fishing wear occurs.

Machines and Safety

"A GOOD safety record is the result of the team work of everyone concerned, from top management down through the ranks to the lowest paid employee on the payroll," said Mr. Carpenter in his address before the joint session on Tuesday afternoon on Safety Problems as affected by Diesel Operation and Increased Mechanization of Maintenance Work.

After stating that, in his opinion, "it can be clearly shown that the reduction of killed and injured employees pays in a cold calculation of dollars and cents," Mr. Carpenter went on to describe in some detail the organization and methods by means of which employees on his road are taught to work in a safe manner.

President Chaney at the speaker's rostrum

Rather than experiencing any increase in accidents due to the advent of the Diesel locomotive, Mr. Carpenter said that the record had improved, the reason being that trains are more apt to arrive when they are expected, and "long aggravating waits for overdue trains are not so frequent."

The increased use of power machines has had a favorable effect on safety performance, according to Mr. Carpenter. "In fact", he said, "the more hand tools we can eliminate the better will be our safety record. The use of power tools is just as advantageous from a safety standpoint as from a standpoint of economy or efficiency." However, he said that there are "some new problems to be met in the increased use of power machines," and went on to refer to several of these, including the handling of fuel, assuring the integrity of the cables and slings used with cranes, the handling of machines on and off the track manually, the possibility of workers' clothing or parts of their bodies becoming engaged in moving parts of machines, and the cranking of engines.

Advice to Supervisors

THE GREATLY increased unit costs of track and bridge repairs have brought about a need for the closest possible supervision, said Mr. Aydelott in his address before the joint opening sessions. It is no longer sufficient for a roadmaster or a master carpenter to maintain a set schedule for inspection duties in his territory, he said. The various gangs should be

checked at times when they are not expecting the supervision to be near.

Mr. Aydelott said he had heard the argument produced on several occasions in behalf of maintenance of way employees that they should have higher wages because of the increased productivity due to skills acquired in present-day maintenance. In view of such arguments, he said, "it behooves the roadmaster and the master carpenter to see that his railroad gets a full day's work for a full day's pay lest his program suffer."

On several occasions during his comments Mr. Aydelott paid tribute to those comprising his audience. At one point he said that, in the use of manpower and materials, "no individual group on the railroad has the opportunity for economies that lie in your hands". At another point he said that "the roadmaster perhaps more than any other individual on his property, is in a position to suggest where maintenance money might be saved by realinement for the purpose of reducing wear and tear on the track and equipment and from improved drainage."

Other matters discussed by Mr. Aydelott included the large savings being realized by the railroads as a result of the means developed for lengthening the life of ties; the research program that the Association of American Railroads has undertaken in collaboration with the lumber manufacturers to determine if still further life can be obtained from ties; research activities of the A.A.R. looking to improvements in rolling stock; and the plans for the association to start construction soon on a new central research laboratory to be located in Chicago.

Fighting Snow in Canada

A BEHIND-THE-SCENES view of snow fighting methods and equipment in use on the Canadian National was afforded in the address by Mr. Risk. He said that operating methods based on years of experience enabled Canadian railways to move traffic with minimum delays through periods of severe winter conditions. He attributed such success to extensive preparations, the use of proper mechanized equipment, trained personnel and close coordination among various departments.

Much of Mr. Risk's address was devoted to a listing and description of the various types of mechanized equipment in use for snow clearing operations on the C.N.R. Such equipment includes 258 wing plows (equipped with drop nose or flanger attachments); 13 rotary plows; 190 flangers; 46 Jordan spreaders; 3 crawler snow loaders; 3 Sicard snow blowers; 30 bulldozers; and 1 Barber-Greene rail mounted snow loader and melting tank unit. The essential characteristics of each of these pieces of equipment and the part they play in the road's snow fighting activities were described. In addition, said Mr. Risk, Diesel crawler cranes, locomotive cranes, tractors with brooms or sweeper attachments, and motor trucks of three and five tons capacity, equipped with plows, are diverted to snow clearing work as the urgency of service may require.

During the last ten years, said Mr. Risk, 6.14 cents of each dollar of maintenance expenditure have been used for snow removal. The use of mechanized equipment, he added, has made possible a definite improvement in snow clearing methods at lower costs. "We are satisfied that greater progress is possible and will be attained through the continued study and proper application of men and machines."

Functions and Responsibilities of Section Gangs

Report of Committee*

THERE is a familiar saying that "necessity is the mother of invention." All of you will agree that during the last 25 years on the railways, the necessity for devising new ideas in the use of materials and in handling work has been acute. The railways do not exercise control over transportation rates, which prevents them from adjusting income to expenditure; therefore, expenditures have to be adjusted to income. This has made it imperative that they effect substantial economies if they are to remain in business as private enterprises.

To the track man this means elimination of non-essentials and lost motion, taking advantage of improvements in equipment and materials, and better work organizations. In less than 25 years many railways have actually reduced their track labor more than 45 per cent and, in the meanwhile, have improved conditions. This is evidence that the track man has not failed to take advantage of newer equipment and material.

All of this change has done much to alter the functions of section gangs. However,

H. C. Fox
Chairman

there are still many opportunities open to the supervisor or roadmaster to improve on the functions of present-day section gangs. Some of those opportunities include proper planning with the foreman of all section work; the scheduling of section work so foreman will know the time limits within which each job should be performed; the routing of section work so each operation may be performed in its proper order, without unnecessary handling of material or waste of labor; and the establishment of standards, so that work may be done economically and with uniform results.

Plan with the foreman all improved general methods and processes which may be applicable to the work in hand. After the work has been studied out and planned, impress the foreman with the fact that it is up to him to carry it out in a satisfactory manner. Refrain from detailing a foreman's work from day to day. When this is done the foreman loses his initiative and looks for these instructions, instead of going ahead and using his own judgment. Encourage the foreman to assume responsibility, to take pride in the upkeep of his section, and to compete in his daily work as far as possible with neighboring sections. Impress on the foreman the present high cost of labor and the necessity for using labor efficiently in order to prevent unnecessary loss. Select apprentices carefully to be trained as foremen. Inaugurate a plan for improving the capacity and knowledge

*Chairman of this committee was H. C. Fox, division engineer, Southern, Greensboro, N.C.; vice-chairmen were L. A. Evans, division engineer, Pennsylvania, Philadelphia, Pa., and M. D. Packham, roadmaster, Atchinson, Topeka & Santa Fe, Emporia, Kan.

of track foremen and apprentice foremen.

A large part of section work is carried out according to a routine established by custom. As long as this routine is followed and apparently satisfactory results are obtained, there may be neither analysis of the methods used nor criticisms of the results. A study may indicate that the routine method is perfectly satisfactory. On the other hand, frequently such a study will prove that some other plan of carrying on the work would give more efficient results.

While it is true that planning section work involves considerable mental effort, nevertheless it is well worth while, because it is only in this way that a supervisor can be assured that the best methods are being used in the most efficient way.

It is a pleasure to watch the way well organized and trained section men make every move count as they go about the performance of some operation. On the other hand, it makes one nervous to watch other section men because they have no apparent plan of doing their work, and are awkward in every move they make.

The fact that a man does certain work awkwardly is no proof that he would not do it efficiently if properly instructed. We cannot expect our section gangs to function correctly unless the foremen take enough interest in the work to instruct and train his men properly.

There is a special knack in handling every tool on a section, from the shovel to a power tamper. A man who knows how to handle a tool skillfully will do much more in a day with the same or less effort than a man who has not learned the proper technique with the tool. Failure of a foreman to instruct his men in the proper handling of tools or the proper performing of work may leave them undecided as to how the operations should be carried out. As a result, they are just as likely to do the work awkwardly as they are to do it easily.

Some supervisors and foremen might doubt the importance of these matters; however, it is our opinion that if a supervisor will make a study of each section gang on his territory and will work out a method of training each of his men to do his work in the best, easiest and most economical manner, the output will increase considerably and the men will find that it is actually easier for them to do a better and more productive job than a less satisfactory job.

Functions Vary Widely

The function of section gangs vary according to climate, weather conditions, character of track and a number of other factors. Therefore, it is impossible to give a schedule of section work that will fit all locations and conditions.

Assuming that small gangs are used for patrol and light tasks, with larger work gangs for the heavier tasks, such as surfacing, rail laying, and ballasting, the functions of section gangs can be more or less restricted to the problems of maintenance on their assigned sections.

The amount of track to be assigned to a section gang depends on the amount of work performed by larger work gangs, the amount of traffic, kind and condition of ballast, size of rail section, condition of rail ends and joints, stability of the roadbed, and many other details of track maintenance. In fact, it depends so largely on local conditions that it is impossible to set up any practical formula for equating miles of track for each section.

On the other hand, the local officers should assign as near as possible equal equated mileage to each section so there will be no excuse for one foreman not maintaining his track as well as the others.

The practice of doubling section gangs should be restricted as much as possible, and when done it should be confined to items of an emergency nature, where other forces or equipment are not available or where the forces must be supplemented quickly to expedite work upon which work trains are employed. Some of the many objections of doubling gangs are that it defeats proper supervision by dividing responsibility between foremen; results in waste of supervision where only one man is needed to direct the combined forces; sets up the possibility of confusion and understanding in the prosecution of the work; and greatly reduces the ratio of productive time to total time as the result of the time spent in traveling to and from work.

If the maintenance budget does not provide enough labor for present section gangs to perform items of necessary work, the section limits should be extended, combining forces and reducing the overhead cost of supervision, and thus eliminating the necessity of doubling gangs.

Favoring one section to the detriment of another is injurious to the morale of the organization.

Power Tools Recommended

Even though most of us are using large work gangs for out-of-face surfacing, we still have use for well-organized section gangs, and it is important that consideration be given to the matter of assigning power tools to such gangs. Today, power units for the operation of power tools are available which are light enough to be handled by the average section gang, and it is surprising how much smoothing and surfacing a section gang can do with power tamping them from one section to another as necessary.

In supplying sections with power machines or power tools the greatest care should be exercised in instructing the foremen and their men in the proper operation of the machines or tools. To insure that the foreman thoroughly understands the operation and upkeep of the equipment, a work equipment repairman should visit each section as it is furnished new units to instruct the foreman personally in their use and upkeep. At this time the foreman should be instructed in all the tricks learned through earlier experience to get the most effective use out of the units.

Some foremen and laborers may be prejudiced against machines and not inclined to give them a fair trial or proper use. This attitude can be overcome by informing the men as to the real advantages to be secured. If the roadmaster or supervisor will do this and will watch and instruct the men, they will soon accept the machines on the same basis they accept picks, shovels, jacks and tamping bars.

Responsibilities

The responsibilities of section gangs have not varied greatly since earlier days, and it is our recommendation that nothing be done by management to discourage or cause foremen or section gangs to discontinue the

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ers, while carrying out its many other and varied tasks. One objection to assigning power machines or power tools to section gangs is that these gangs can seldom be kept at any one job consistently, which necessitates that the machines lie idle part of the time. However, such tools can be used with very little lost operation by pass-

Functions of section gangs vary according to climate, kind of track and other factors

practice of being custodians of company property within section limits, or to remove the following responsibilities.

(1) Periodic inspection of all company-owned tracks and turnouts, making corrective measures when required, including lining, smoothing, gaging, bolt tightening and brush cutting.

Periodic inspection of industry-owned side tracks, with a report to the supervisor or roadmaster when corrective action is required on the part of the industry.

(2) Inspection of the track, roadbed and bridges, trestles and culverts during periods of heavy rains or high water that might result in damage, providing flag protection when required.

(3) Periodic patrol of right-of-way to see that fences, ditches and slopes are properly maintained, and that there are not encroachments or trespassing. If the maintenance of proper ditches, pipe openings and slopes, including the scaling of cuts, is within the capacity of the section gangs, then such work must be done; if not, help must be requested from the supervisor or roadmaster.

(4) Patrol and protect points at which slides may occur during inclement weather.

(5) Remove combustible material from the vicinity of bridges, buildings and other structures in order to minimize fire hazard.

(6) Extinguish fires that are noticed on or along the right-of-way.

(7) Observe telegraph and telephone lines during trips over the section and report any breaks.

(8) Observe and report any failures in water supply.

(9) See that old material is promptly gathered up and sent to concentration points.

(10) Remove snow when its presence in swiches would cause them to fail, and also any packed snow and ice from flangeways at road crossings. If time permits during a storm or after the end of a storm, remove snow from station platforms and any company-owned sidewalks.

(11) Periodic inspection of overhead and side clearances.

(12) Provide for the safety of his men.

Discussion

H. W. Kellogg (C. & O.) opened the discussion by calling attention to the necessity of having good foremen in order to obtain and hold good men. He finds, in general, that a better class of men is obtainable in rural communities than in the cities. Mr. Kellogg uses all means possible to train foremen and men, encouraging the better men to take advantage of the machine operator's higher rate by learning to operate track machines.

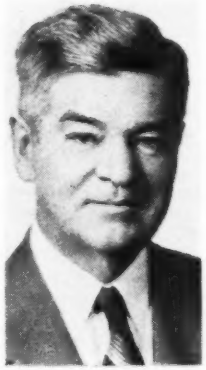
G. L. Sitton (Sou.) asked for opinions on whether small machines, such as spot tampers, should be passed from one section to another as they are required for use, especially when there are not enough machines to supply all sections. R. L. Fox (Sou.) stated that, where possible, one machine should be assigned to each section in order to insure responsibility and proper care of the machine. E. E. Crowley (D. & H.) agreed with Mr. Fox.

Mr. Crowley raised the question of how to get enough men when lengthening sections or consolidating section crews. President Chaney stated that in some cases it will be necessary that the headquarters be moved to a location where men are available.

On the matter of cleaning terminal yards, G. M. Strawhun (M. P.) stated that he finds a clamshell a great help in picking up refuse, including iron ore spilled from cars, although hand labor must be used to supplement the machine. President Chaney said he had noticed clean yards on a number of roads, particularly the Central of Georgia, and was advised by an official of this road that this was accomplished simply by putting on enough men to do the work.

Modern Methods of Controlling Vegetation and Woody Plants

Report of Committee*



A. E. Botts
Chairman

THE CONTROL of vegetation on the right-of-way has remained a problem since the first railroad was built. For almost a century only hand methods were employed in what has now become generally recognized as one of the fundamentals of good maintenance. During the past 30 years, however, control methods have improved steadily. Most important and very promising advances have been made within the past several years, and now the word eradication appears in discussions of the subject. Each year sees improved methods of killing weeds and other objectionable growths, and such control is being given wide attention by those responsible for railroad maintenance.

Your committee approached the problem by means of a questionnaire, which was designed to produce a broad and representative picture of current practices. This was addressed to 85 Class 1 railroads, in addition to the 35 committee members. Response from these sources, while less than expected, was supplemented by data received from distributors of chemical compounds and from others engaged in research.

Proper control of vegetation includes not only the roadbed, but the entire right-of-way, from fence to fence, including yards, station grounds and areas around shops and enginehouses. The greatest primary benefit, however, is believed to result from the elimination of weeds in the roadbed, particularly in the ballast section.

Why kill weeds? There are many answers to this question. Weeds and their roots in the roadbed are obstructions to drainage, which probably is the most important essential in maintaining good track. Constant growth collects dust, cinders, dirt and other foreign matter and, with subsequent plant decay, fills the ballast section with fouling material. As a result the voids in the ballast become clogged, and periodic ballast cleaning is required, or it becomes necessary to replace the old ballast with new. Keeping the roadbed free of vegetation, therefore, not only reduces maintenance costs, but capital expenditures as well.

The reasons for killing weeds vary with geographical location, topography, traffic density and other conditions. Weeds may be killed on branch lines for quite different purposes than on main lines. In some cases control is exercised to conform with state law. Replies to our questionnaire give the principal reasons for the destruction of weeds as presented in the accompanying table.

Types of Weeds

Weeds may be divided into four main groups—annuals, winter annuals, biennials, and perennials. To determine the stage in the growth of weeds at which methods of destruction are most effective requires some knowledge of their habits and methods of reproduction. The

*Chairman of this committee was A. E. Botts, assistant chief engineer, Chesapeake & Ohio, Richmond, Va.; vice-chairmen were H. E. Carter, roadmaster, Norfolk & Western, Petersburg, Va., and J. F. Smith, roadmaster, Missouri Pacific, Little Rock, Ark

most effective time for controlling weeds is generally assumed to be in the early part of the seeding stage. This may be true of annuals, but it does not apply to biennials and perennials.

Annuals complete their growth in one year; that is, the seeds germinate in the spring or summer and the plants die in the fall. Most annuals produce large quantities of seeds which, in certain species, retain their vitality for many years. The seeds of quack grass and horse nettle have a life of four to ten years. Certain kinds of thistle and mustard have seed life of more than 20 years. The most effective time to destroy their seeds, therefore, is while the seeds are germinating.

Winter annuals include a small group of weeds which behave like fall wheat, although some may act as true annuals. Their seeds usually germinate in the fall under favorable conditions, and the plants complete their growth in the following spring. Among other methods, discing in the spring has been found to be effective in controlling weeds of this class.

Biennials complete their growth in two seasons. The seed is produced in the second season, after which the plants die.

Perennials are plants that produce roots, rooting stems or root stalks that remain alive for several years. The primary function of the root stalks is food storage, and it has been found that the food reserves of roots in undisturbed areas are usually lowest during the blossoming periods and highest during early winter and early spring. As the top growth, after ripening, supplies food to the root system, the most effective stage for the destruction of these weeds is that which will prevent top growth from early summer until the end of the growing season.

There are several methods used in killing weeds in the roadbed. These include hand weeding, flame burners, steam weed destroyers, mowing machines, ballast discers, and the application of oils and chemicals. Control methods differ widely, because the standard of maintenance and the volume and kinds of traffic vary between roads and on different parts of the same road. The method used is also influenced by the density and persistence of vegetation and rate of growth.

Until about 30 years ago hand methods were depended upon entirely for the control of weeds and plant growth. Weeds were removed from the ballast section by hand and from the shoulders with shovels and scuffle hoes. Hand work was not only expensive, even at the comparatively low wage scale then prevailing, but such work was necessary at times when the labor was needed for other maintenance work. The introduction of the methods listed above effected economies in this work, and also permitted more extended coverage, since weed removal by hand methods was confined largely to the more important lines. Hand methods cannot be justified with present labor costs, and are held to the absolute minimum on all roads. A few roads report using hand weeding only following the use of scarifiers; others only in limited areas where other methods have not been effective.

Since its introduction, the mechanical equipment used in this work has, of course, been greatly improved. The most notable advances, however, have been in the field of chemicals.

On several roads the various methods of control are coordinated to some extent. Where mowing machines and weed burners are used over the same territory, the mower is operated first, the burner following after an interval sufficient for the plant stalks to dry. If the track is to be treated with chemicals or oil, any discing or other disturbance of the ballast should precede such application.

The use of steam as a weed destroyer appears to have declined somewhat during the past 15 years, although several roads are now using this method, particularly in combination with other means. The steam weed destroyer consists of a system of piping arranged on a flat or other car in such a manner that steam, super-heated to 500 to 650 deg., may be applied direct to the vegetation over the width of the road bed. Only the less hardy types of vegetation are killed for the season by this method; the hardy and fibrous varieties are merely wilted and kept down temporarily. The number of steamings required for effective treatment depends on the kinds of vegetation and the extent to which it must be kept down. Best results are obtained by making the first application during the early growing season while vegetation is tender, followed by a second steaming three to four weeks later. The average cost per application is $10 per mile.

The weed burners in service on the various railroads are divided between the oven or enclosed-flame type and the open-flame type. Some are self-propelled; those not self-propelled usually require the use of a heavy-duty motor car. The open-flame type has a number of burners on extended arms, which may be operated individually or together, and its greater flexibility and range give this type burner an advantage when used on track having high ballast shoulder. The oven type has been found preferable for branch lines and track having low ballast shoulder. Use of the flame burner requires careful handling and a closely following patrol to extinguish incipient fires. The fire hazard is an objection to this type of weed control, particularly in timbered or grain-raising territory in dry periods of the year. Operating costs vary from $4 to $30, and average $16 per burning per mile.

Roadmasters' Section

The use of chemical weed-killing agents by the railroads has been increasing steadily

Reasons for Destroying Weeds

Benefits	Order of Importance 1	2	3	4	5	6	7	8	9
Reduces fouling of ballast	11	4	1	2	2	–	–	–	–
Retards decay of ties	2	1	2	2	3	2	3	3	1
Improves drainage of track	4	7	4	2	1	2	–	–	–
Aids track in drying out	1	1	3	8	2	2	2	–	1
Reduces labor for normal maintenance	3	4	3	2	5	1	–	1	–
Reduces interference with traction	5	–	2	–	–	4	3	1	5
Facilitates tie and track inspection	–	–	–	–	3	4	4	4	5
Helps prolong life of track materials	–	1	–	–	1	2	2	7	7
Improves appearance	–	1	2	2	4	1	3	2	5
Prevents snow drifts	1	1	2	2	1	2	–	–	–

Discers—Mowing Machines

About half of the railroads reporting state that they use ballast discers in their weed control programs. With some, the

It was quite a job to get this large group of the Southern together for a picture. Seated (left to right): E. Bennett, ch. engr. maint. of way & struct.; G. L. Sitton, asst. ch. engr.; T. M. von Sprecken, asst. to ch. engr.; R. L. Fox, div. engr.; H. A. Metcalfe, div. engr. Second row: Frank M. Kaylor, asst. supvr.; J. S. Wearn, ch. engr. maint. of way & struct.; A. J. Denton, asst. div. engr.; J. D. Henley, trk. supvr.; J. W. McPherson, trk. supvr. Third row: J. E. Griffith, asst. ch. engr. maint. of way and struct.; W. H. McNairy, trk. supvr.; B. H. Goodwin, div. engr.; H. C. Fox, div. engr.; J. L. Fisher, trk. supvr.; S. B. Hinton, Jr., trk. supvr.

weeding benefit is incidental to other purposes; with others it is the prime function. Discer cars may be self-propelled or, in the case of the lighter type, towed by a motor car. The heavier types are also equipped with scarifiers for loosening cemented ballast. Ballast discers are effective in removing weed growth and in keeping the ballast open. Scarifiers are used to better advantage in stone ballast, while discers are more effective in gravel. The number of discings given annually may be from one to six, as conditions require, and the average cost per discing is slightly less than $5 per mile.

Mowing machines of several types are in general use both on roadbed and over right-of-way. These include: (1) On-track mowers, some of which are self-propelled and self-powered, which mow swaths up to 6 ft. outside the rails and over almost any contour and angle; (2) Tractor mowers, which, of course, may mow anywhere without traffic interference, and can move over highways to reach work locations; (3) Motored sickles, which usually are hand guided, self-propelled and self-powered, and mow fairly heavy vegetation. They are used to advantage on station grounds and for trimming at crossings and such points beyond the reach of track-bound mowers; (4) Motor lawn mowers and trimming cutters, most commonly used on station grounds and around buildings where grass requires frequent attention. The number of mowings necessary and the cost of the work vary greatly with climatic, geographic and other conditions.

Right-of-Way Control

In considering control methods, sharp distinction must be made between the requirements of railroad right-of-way and roadbed. The conditions, objectives and vegetation of one are entirely different from the other. The complete and permanent removal of all forms of growth from the roadbed is to be desired, whereas beyond the roadbed shoulders the ideal right-of-way would have, to the exclusion of all other growth, a thick and continuous grass sod. A well sodded right-of-way is necessary as a protection against erosion by water and wind, and to keep down dust.

Growth on right-of-way still is largely controlled by hand work with axes, scythes, briersnaiths and such tools. But within the last two decades there began a movement toward grading the right-of-way, which will have a marked effect on its care and growth control. This work remained a comparatively small scale operation until given impetus during recent years by the development of large capacity, motorized earth-moving equipment. Right-of-way grading programs were expanded as such equipment became available, and now the practice has been adopted by a number of roads. The principal objectives of such work are to improve drainage, remove conditions conducive to slides in cuts and fills, and thus to reduce maintenance costs. This work, of course, will not extend throughout from fence to fence, but the 4 to 1 slopes which usually are the general aim will lend themselves to far more economical treatment. Tractor mowers and other machines may readily be operated over greater areas of right-of-way, and power spray vehicles may be used to advantage in low-cost application of chemical solutions.

Chemicals

It is in the field of chemicals that most promise lies for future economical and absolute control of vegetation and woody plants. The use of chemical weed killers by the railroads of this country began about 40 years ago and has been increasing steadily until now millions of gallons of chemical solutions are applied annually. The first small-scale efforts to use chemicals, necessarily experimental in character, involved only sodium arsenite. Being very poisonous, it had the disadvantage of being fatal to live stock. For many years this continued to be the only weed killer used in railroad work. It is noteworthy that the number of railroads accepting this arsenical weed treatment prior to the first world war, during which the work was suspended, gave recognition to the fundamental value of the method at a time when labor costs were very low. Sodium arsenite still plays an important part in the chemical weed-control programs of our railroads.

About twenty-three years ago experiments with another chemical, the non-poisonous sodium chlorate, were begun in this country. This proved to be a very effective chemical, but it also had one disadvantage. Its use was found to present a serious fire hazard, because of the fact that any organic material wetted with a solution of sodium chlorate and then dried becomes inflammable. In a short time, however, it came to be formulated with calcium chloride, and the fire risk then was reduced to the minimum. This substance is said to be somewhat corrosive in its action on track fastenings and other ferrous metals. In July, 1947, the senior agronomist of the United States Department of Agriculture stated:

"For more than 20 years, sodium chlorate has been the standard weed-killer for sterilizing soil and for destroying deep-rooted perennial weeds difficult to kill by other means. It is still the best all-inclusive weed-killer available. Millions of pounds are used annually to treat soil infested with bindweed, Bermuda grass, Johnson grass and similar pests, and to destroy all vegetation regardless of species."

A successful herbicide containing small quantities of arsenic with oil has been developed over the past five years. Its use is said to hold little or no risk to live stock, and in some cases it appears to have replaced the two older types for chemical application.

Several roads use oils effectively for the control of vegetation in roadbed. The mixtures range from 1 part creosote and 10 parts fuel oil to 1 part creosote and 3 parts petroleum aromatic residues. One or two applications are made annually, as necessary, over widths of 16 ft. to 20 ft. (8 ft. to 10 ft. each side of center line). The quantity used per mile per application varies from 95 to 250 gal. in accordance with local requirements. This method has the advantage of some degree of residual effect (oil over other emulsions of water), and comparative economy—the cost ranging from $16 per mile in the Southwest to $40 per mile in New England.

More than 100 different chemical substances have been used for killing weeds. Those discussed briefly here are the ones of greatest interest and usefulness to railroads at this time. An immense amount of time and effort are now being spent in research and experimentation,

the result of which may be expected to simplify the problem for the railroads in the future. Within most recent years very notable advances have been made, and a number of new chemical compounds have been offered commercially. So much publicity has attended their introduction that the whole matter is somewhat confusing to anyone without specialized knowledge.

2,4-D Effective

Of the chemicals found in recent years, 2,4-D (2,4-dichlorophenoxyacetic acid) has perhaps been given widest attention. This "growth regulator" is a hormone-like substance which has extraordinary ability to kill plants when applied to the foliage as a spray or dust. It acts chiefly on plants with broad leaves, and in the concentrations used it is almost harmless to practically all grasses except when grasses are in the seedling stage. 2,4-D is not harmful to human beings or to animals, but continued exposure to large quantities should be avoided. It is used in a very weak solution, a small quantity going a long way. For this reason it is one of the least expensive herbicides.

Three basic types of 2,4-D are on the market: (1) The sodium salt, ordinarily the cheapest form of 2,4-D, is satisfactory for use on easily-killed species of weeds. It is usually not so effective as other forms on plants with waxy leaves or on most shrubs. As it washes easily from leaves, rain falling within six hours may reduce its effectiveness. (2) Amine salts, which are readily soluble in water are easy to use. Rain falling two hours after application does not destroy their effect. The amines usually are midway in cost between the sodium salt and the esters. (3) The esters, or alcohol derivatives of 2,4-D, are the most expensive forms, but in some respects are the most potent. About equally effective, they are preferred for weeds difficult to destroy by other forms, particularly woody and waxy-leaved plants. They penetrate foliage quickly and are less affected by rain. These substances are less easily removed from spraying equipment than are other forms, and they appear to be more vola tile.

Reports of the results secured from the use of 2,4-D vary somewhat. What seems to be a rather comprehensive pioneering test was begun by the West Penn Power Company late in 1944, in an effort to investigate the effectiveness of 2,4-D as a method of right-of-way brush control. In cooperation with the Dow Chemical Company, the tests extended through 1946, and involved spraying with every available form of 2,4-D more than 30,000 woody plants, representing one and two-year sprout growth ranging from 12 to 100 in. in height. Final results are unknown to the committee, but a few observations made in the report are of interest in their possible application to railroad work. They are:

"The material which gave the best results was an ester of 2,4-D at a concentration of 1000 to 2000 ppm (parts per million) in water."

"It was found that hand spraying cost approximately 30 man-hours per acre, while power spraying cost about 7 man-hours per acre."

"It is anticipated that great progress both in methods of application and in formulations will be shown during the next few years. Even with today's methods, costs of spraying are in line with mechanical methods."

The report lists 38 woody plants, including one variety of elm, which have been killed with an ester of 2,4-D, and it also names ten varieties of woody plants that are difficult to control with an ester of 2,4-D. This latter list includes ash, oak, hickory and maple.

Special Report on 2,4-D

The Oklahoma Agricultural Experiment Station, Oklahoma A. & M. College, in cooperation with the Research division, Soil Conservation Service, U. S. Department of Agriculture, in January, 1948, issued a Progress Report on Chemicals for Brush Control, which is a very informative work covering approximately a three-year period of tests. According to this report it was found that for complete defoliation it was essential that leaves and twigs be uniformly covered with the spray solution. A rather coarse mist applied at a pressure of 100 lb., or slightly less, has given best results when applied to green, growing brush. It is highly important that adequate spreader-sticker material be used in the spray solution.

Following are some of the effects of spraying with 2,4-D, as given in that report:

"Spray solutions were 2,000 ppm 2,4-D with water. The highest percentage of plants affected occurred on brush from 4 to 7 ft. high. The spray seemed ineffective on larger trees. Preliminary study indicates that some species are susceptible to 2,4-D and others are not. Even the second application has little or no effect on many species. In general, the 2,4-Ds appear to cause a gradual dying of the trees and brush affected. Leaves turn brown and twigs curl and twist in two to three weeks. The plants most readily affected soon developed abnormal knotty growth of the cambium layer along the main stems, which condition often caused splitting and deterioration of the wood. The 2,4-Ds were not toxic to native grasses, but did kill broad leaf plants, such as cotton and legumes. As the mist from sprays of these products is light and drifts easily, extreme caution should be used when applying them near orchards and gardens.

"The use of Ammate (ammonium sulfamate), a yellowish granular water soluble compound, is described as follows: It is not a selective plant killer as is 2,4-D, but like 2,4-D, it is not toxic to man, animal or soil. The solution contained one pound of the powder to each gallon of water. Practically all trees, brush, grass and other plants sprayed were affected and began to turn brown within 24 to 48 hr. This includes brush species on which 2,4-D was not effective. If leaves did not fall soon after treatment they turned a light straw color. The plants often produced clusters of new leaves, however, along the main stems, and sometimes a few sickly sprouts appeared from the roots. Sometimes a second or third application was necessary to kill this growth completely. The spray is fairly heavy, and the mist can be controlled when working near orchards and gardens.

"Mixtures of 2,4-D and Diesel oil and of 2,4-D and ammonium sulfamate were tried in an effort to obtain more effective results on brush. The 2,4-Ds in water solutions alone did not always produce similar effects on brush from one application to another, although effort was made to duplicate all conditions known to influence it. Moreover, trees over 3 in. in diameter and 7 ft. in height are not usually affected by water solutions of 2,4-D.

"Mixtures of 2,4-D and oil sprayed on scrubby oak trees 4 to 6 in. in diameter and up to 10 ft. high produced good results, 94.5 per cent being affected. The mixture used per acre consisted of about 10 gal. of oil and 1½ to 1¾ gal. of 2,4-D stock solution on approximately 20,000 plants. This method permits the 2,4-Ds to cling longer to the leaf surface for absorption and to be carried into the plant tissue in more effective amounts. But the quantity of oil should be held to a minimum so that the leaf is not burned to the extent that it hinders the process.

"Ammonium sulfamate and 2,4-D mixtures produced good results on plants susceptible to 2,4-D tested, except where excessive rain followed immediately after treatment. Seventy to 95 per cent were affected. A small quantity of ammonium sulfamate apparently was sufficient to weaken the woody plants and thus give the 2,4-D a better opportunity to attack, without damage to the grass intermingled with the brush.

"Based on current prices of chemicals, the cost of application was high, but relatively large quantities were used—250 gal. per acre in the 1945-46 and 47 tests, increased to 600 gal. per acre on denser brush. It is believed, however, that if the work was undertaken on a scale of volume production, costs would be reduced to a practical level."

Service Report by Contractor

In connection with its study of chemicals for the purpose of large-scale eradication of brush, the comment of one company, through its director of research, is very interesting. Excerpts selected from a research report published in its Bulletin of March, 1948, are here given:

"Our company sells service. This is stated to emphasize the fact that we are not manufacturers or salesmen of chemicals, and so have no primary interest in any one chemical. It is our belief that a brush control service could be developed only around a chemical or chemicals which will kill roots as well as tops of a very high percentage of woody plants on

When all of the New Haven representatives were brought together they made quite an impressive group. Seated (left to right): Michael F. Sullivan, rdm.; John A. Gray, Jr., trk. supvr. Standing: Charles P. Richmond, asst. trk. supvr.; P. O'Reilly, trk. supvr.; W. W. Chaffee, trk. supvr.; A. L. Bartlett, asst. to ch. engr.; A. A. Cross, engr. maint. of way; E. E. Turner, supvr. wk. equip.; J. B. Bell, engr. of trk.; J. M. Reardon, trk. supvr.

the right-of-way. 2,4-D, because of its selectivity, is valuable in the fight against many weeds in lawns, gardens and field crops. But the very selectivity which makes it valuable for that purpose causes it to be disappointing against tough, deep-rooted woody plants. Newest among hormone-type herbicides is a substance called 2,4,5-T (2,4,5-trichlorophenoxyacetic acid). It is reported to be of value against some of the species not injured by 2,4-D, but seems also to be selective. Time will tell what part 2,4,5-T may play in strengthening the weakness of 2,4-D.

"After three years of research and field use, we are assured that one of the comparatively new chemicals does meet our requirements for satisfactory large-scale brush eradication. This product has been discussed in herbicide literature since about 1936 by its chemical name of ammonium sulfamate, known commercially as Ammate. It is a non-selective killer of tree growth, and is non-toxic to men and animals. Its killing power seems but little affected by variations in temperature, humidity and sunlight. With one application on mixed species it is possible to kill 75 to 90 per cent, root and branch, even in dense stands, of all tree growth on the right-of-way.

"We believe that large-scale brush eradication is here to stay, and as our research continues we hope to find even more satisfactory chemicals for the purpose."

Compounds of Boron

Other chemicals have been used to advantage to a limited extent. Included among these are compounds of boron, one of the minor elements necessary for plant growth. While very small quantities are essential, larger quantities of boron can cause death to vegetation. Under certain conditions its repeated use tends to produce soil sterilization for varying periods, depending on the time interval before it leaches from the root section of the topsoil.

Commercial preparations of boron now available are said to be non-combustible, non-corrosive to ferrous metals, and non-poisonous to animals. Its use in railroad work has been confined largely to areas around bridges, buildings, certain tracks and other facilities where inflammable materials are stored. Quantities required for effective use vary, of course, with the vegetation and other local conditions, but averages between 15 and 35 lb. per sq. rod. One of the largest western railroads reports the cost of this material applied to be approximately $1.80 per sq. rod.

A very successful test application of chemical spraying was reported by a railroad on parts of its south Florida lines. The application was made under the most severe conditions, and is particularly noteworthy because the results showed absolute kill of Bermuda grass, including roots, one of the most difficult of all grasses to control. It was also very effective on additional grasses which other methods had been unable to kill. We are unable to give the chemical composition of the spray solution used as it was a special commercial formula.

Limitations of Chemical Control

Some of the handicaps and deficiencies of past and present practices of chemical weed control as applied to railroads may be summarized as follows:

(1) While most annual weeds and grasses are easily killed, many resistant perennial weeds, grasses and vines profit by the removal of the annuals and at once invade the territory from which this competition has been removed.

(2) After a few years of inadequate chemical treatment many roadbeds became infested with the hardier types of biennials and perennials, common among which are bindweed, Bermuda grass, Johnson grass, quack grass, trumpet vine and milkweed.

(3) Poor timing of treatments with relation to (a) habits of the vegetation, (b) growing season, and (c) rainy and dry seasons.

(4) Variable factors of nature, particularly changeable seasons with respect to rainfall, which often make difficult an early appraisal of results. The soluble salts of arsenic, chlorate and other chemicals oftentimes are washed away after two or three inches of rain. The variable growing seasons as between different sections of the country, whereby satisfactory results of July applications in the relatively short seasons of northern states cannot be compared with results in southern sections where the long growing seasons and shallow frost line constantly encourage vegetation to recur.

(5) Inadequate long-term planning on the part of the railroads. Lack of programs and preparations based on each road's, or even each subdivision's, requirements with respect to its vegetation and other local conditions.

(6) Fluctuation of railroad budget appropriations, which even in normal times often prevents compliance with a systematic long-term program, or even with steady, uninterrupted seasonal schedules.

(7) Lack of a "definition of terms", or a statement of minimum requirements on the part of railroads as to what scope and degree of effectiveness of chemical control shall be acceptable and paid for when contracting such work, it being generally agreed that contracting offers greater efficiency and economy in any broad program through specialized personnel and equipment. Contracting is feasible now that so many organic chemical compounds are available, which can be applied singly or in combination as local conditions may require.

Conclusions

(1) That control of vegetation and woody plants is a wide-spread problem, the satisfactory solution of which is necessary to high-grade railroad maintenance.

(2) That this committee cannot at this time make a definite recommendation for overall control of the vegetation problem of American railroads, principally because:

(a) Conditions and growth vary greatly as between different sections of the country.

(b) Ever-changing and improving methods of control. The effectiveness of several control methods has been demonstrated, but it should be kept in mind that studies, experiments and developments are constantly underway. This is particularly true in the field of chemical control.

(3) That each railroad should survey itself, determine its requirements, and establish a program looking toward the ultimate control condition that should be maintained.

(4) That each railroad study the equipment and methods designed to aid in achieving such control, and adopt the best possible means to be employed to that end.

Discussion

In reply to a question from J. C. Warren (Penna.) as to what effect 2,4-D might have on wheat, W. H. Moyer (Chipman Chemical Co.) said that this chemical is used as a selective herbicide and, as such, is harmless to grains.

F. A. Hess (I. H. B.), in reporting on his effective use of Boron compounds for killing weeds around stockyard areas, told of the good results he had obtained with weed burners in eliminating the fire hazard caused by the dead vegetation. C. F. Reade (Reade Manufacturing Co., Inc.) warned that at least 30 days should elapse after chemical spraying before any burning is done so as to obtain the full effect of the chemical.

G. L. Sitton (Sou.) asked if anyone had used pentachlorophenol as a weed killer. A. D. Chapman (Chapman Chemical Company) replied that several railroads had gotten satisfactory results from experimental sprayings. He advised that an eight per cent solution of pentachlorophenol in petroleum oils, with an emulsifying agent, added, gave a quick kill. However, the hardy perennials, especially Bermuda and Johnson grass, tend to reappear several weeks after spraying. Mr. Chapman expressed the opinion that, if pentachlorophenol were used twice a year for several years, it would even kill Bermuda and Johnson grass.

Roadmasters' Section

Keeping Power and Spring Switches in Operation During Winter Storms

Report of Committee*

THE RAILROADS have established an enviable reputation for keeping traffic moving normally in the winter months more consistently than any other transportation agency. With the heavy traffic and increased train speeds of today it becomes more important than ever before to keep trains moving, regardless of weather conditions, if it is possible to do so with safety.

Many railroads have installed, or are installing, centralized traffic control at locations where traffic is the densest. This development has increased the number of power and spring switches to the point where a great deal of consideration must be given to the problem of keeping such switches operating efficiently at the lowest possible cost. Failure to keep power and spring switches in operation during winter storms would result in serious train delays, and in a very short time would demoralize traffic over an entire operating division.

Where severe winter conditions prevail, the hand cleaning of snow and ice is very expensive. In view of this and the shortage of labor, other methods of doing this work should be thoroughly explored by officers responsible for switch maintenance in order to arrive at the most efficient method for the locations in question.

In general, the problem can be divided into two classifications, namely:

(1) Passenger and freight terminals

(2) Multiple main-track crossovers and sidings

Organization for Storms

Preparedness is the first law of snow and ice removal. The responsibility for a good organization rests with the officer in charge of maintenance over the entire division. A staff meeting should be held in the fall to go over all the details of the organization.

A. B. Hutson
Chairman

Roadmasters, track supervisors, signal supervisors and others concerned should be briefed on personnel, methods of transporting men, equipment available, and other matters pertaining to this work.

Weather forecasts should be made available to members of the organization to provide as much time for advance preparation for a storm as is deemed necessary.

Section foreman, maintainers and others involved should be trained to act promptly on their own initiative when a storm starts. At night, when men might be asleep, dispatchers and operators must be lined up to call the men as needed.

A good dispatching or carrier phone system is a distinct advantage in combating a storm. A phone of this type allows the officer in charge of the work to keep in close contact with storm conditions on the division, and thus be able to take the necessary action to prevent delays to trains and to place his forces to the best advantage.

The transportation of forces is a very important item. Trucks will be found to be very efficient for use in this work if the physical characteristics of the country and the highways permit their use.

At important outlying switches where no other form of protection is afforded, a man is usually placed on duty with the necessary tools and equipment and is instructed to remain at his post until relieved. At these locations a small shelter is generally provided, equipped with a small stove and a telephone, and these points are often wired for electricity to provide a floodlight for the switch.

Men assigned to such locations should advise the dispatcher or operator immediately when they arrive, and should notify him that they will protect their assigned locations for the duration of the storm, or until relieved.

At locations protected by switch heaters, the heaters should be lighted as soon as the storm begins in order to get the rail warm, and thereby start melting the snow immediately as it falls.

In terminals, where switches are protected by heaters, one man can generally be assigned to patrol a considerable number of switches to insure that all heaters and switches are functioning properly. It will be found desirable to relieve for rest any men not actually needed at the end of a work period, when it is possible to do so, in order to have sufficient force available for duty if a storm turns out to be of longer duration than expected.

The cooperation of other departments is essential in keeping switches in operation during storms. Locomotive engineers and firemen should be instructed by their superior officers not to permit the overflow of their injectors to run, or to blow off their engines, while passing over a switch.

The flattening of slopes and cut faces to eliminate snow pockets around switches will prove beneficial in many cases, and snow fences will be found to be of considerable

*Chairman of this committee was A. B. Hutson, roadmaster, Chicago, Burlington & Quincy, Galesburg, Ill.; vice-chairmen were D. Zoli, supervisor of track, Grand Trunk, Detroit, Mich. and W. J. Cable, division engineer, Minneapolis, St. Paul & Sault Ste. Marie, Stevens Point, Wis.

value in keeping snow out of switches in certain locations.

Following are the more common methods of keeping switches free of snow and ice:

(1) Fixed heaters employing bottled or natural gas, electricity or oil as a heating medium.
(2) Oil-burning pots or boxes
(3) Oil pressure burners or torches and snow melting cans
(4) Chemical lubricants, oils, etc.
(5) Compressed air
(6) Steam coils
(7) Weed burners
(8) Hand tools

(1) Fixed Heaters—Bottled Gas—Very effective results are obtained with this type of heater if properly installed. Many improvements have been made in this type of heater in the last few years and installations have been made whereby gas heaters are ignited by remote control from towers a considerable distance away. The desirability of this type of equipment is manifest in C.T.C. territory and at certain locations where transportation is difficult.

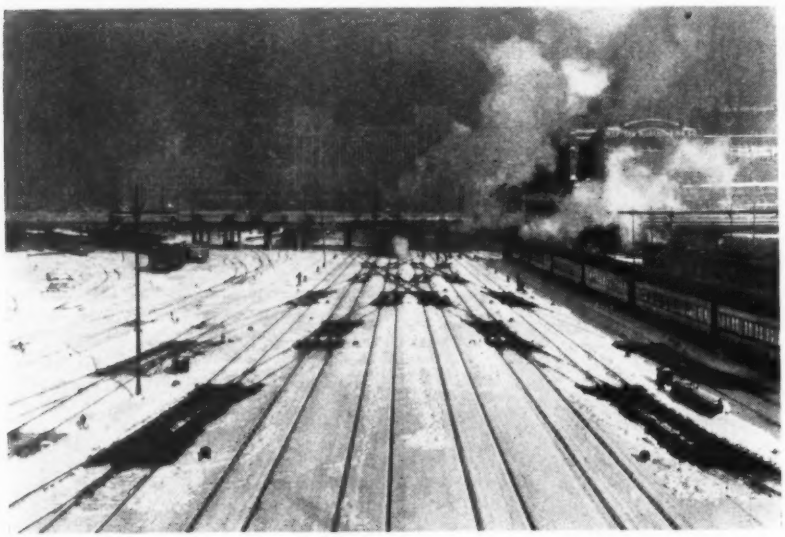
Fixed heaters burning natural or city gas are used very effectively in locations where this type of fuel is obtainable.

Electric heaters may be divided into three classes—radiation, contact, and a combination radiation and contact type. All may be controlled from a central point and the heat may be started quickly at the first indication of a storm. Electric heaters are giving satisfactory results on many railroads.

Oil-burning heaters of the fixed type are used with a fuel supply tank located near the installation. These heaters consist of two general designs—the intermittent spraying and the constant-burning types. The former type uses casing-head gasoline, snow melting or low-pressure hydrocarbon oil for fuel, and the latter uses distillate, furnace oil or kerosene.

(2) Oil-burning Pots or Boxes—In general, the design of pots varies little. These pots are portable and are placed in the cribs directly under the switch points and stock rails. The flame is produced from a wick, and kerosene or similar oil is used for fuel. These heaters are being used with success by many railroads, especially around terminals where oil can be obtained readily for refilling as needed, and where occasional attention can be given them. Where these heaters are used, the ties should be protected from the flame by asbestos or sheet metal.

(3) Oil Pressure Burners and Snow-Melting Cans—Pressure burners or torches used for snow and ice removal are of two general types—self-generating and vacuum. In both types the fuel burns in a pre-heated burner and the flame produced melts the snow at which it is directed. With snow-melting cans, the fuel is sprayed upon the snow or ice as a flaming fluid. Both burners and cans are effective in removing ice film around switch points.



Preparation and organization are paramount in keeping switches open during storms

(4) Chemical Lubricants, Oils, etc.—Some railroads have been quite successful in their experiments with a chemical de-icing lubricant that has been recently developed. This chemical is applied to the switch parts by spray or brush. Ice will form over a coating of the solution but will vibrate off if the switch is thrown over or the points struck a light blow.

This chemical is a lubricant and is not injurious to metal. The amount of protection received from one application depends on weather conditions and traffic.

Snow-melting oils are used by some railroads to prevent ice formation on switch points and to melt light snow.

(5) Compressed Air—In terminals, hump yards and other locations where compressed air is used to operate switches or retarders, or for other purposes, air can be successfully hooked up with small hose and nozzles to blow snow from switches. With such equipment, one man can take care of several switches in a fairly heavy storm.

(6) Steam Coils—Such coils are restricted to certain locations where steam is available.

(7) Weed Burners—Weed burners are effective where good drainage prevails, but should not be used around electric switch machines because of the effect of the extreme heat on these machines. They can be used to good advantage in cleaning up between storms.

(8) Hand Tools—Hand cleaning with brooms, shovels and scrapers is more economical in temperate climates with very little snow and ice. However, it is sometimes the only method that will keep switches open during a driving blizzard. Costs of this method run high in most cases, as labor is usually employed on an overtime basis, which frequently involves double time.

All power and spring switches should be inspected at regular intervals. A good plan is to require a joint inspection by the signal and track departments.

Maintenance of these switches must be to the highest standards. Good rail, ties and a clean ballast section are essential. Switches should be kept in good surface and line and be properly anchored.

Good drainage is essential to good operation. This requires study at each location to obtain the best results. Poor maintenance of switches will result in failures and train delays, regardless of how diligently laborers work or snow-melting equipment functions.

Clean Up Following Storms

Just as soon as possible after a storm subsides, snow should be thoroughly cleaned from around switches, and loaded out if necessary after heavy snows. In many locations the use of a tractor with end loader, and a dump truck, will expedite the work and effect a saving in time and labor.

At this time also, snow-melting devices should be inspected and any adjustments or repairs needed should be taken care of. If oil pots are used, they should be refilled, cleaned and the fuel supply checked.

Pneumatic and gasoline tampers are effective in removing ice from around switches to supplant hand labor with picks and shovels, especially after prolonged periods of cold weather.

Conclusions

A good organization is the first requisite for keeping power and spring switches in operation during winter storms.

Track foreman must be trained to act promptly without direct instructions.

Good snow-fighting equipment, adequate transportation for forces, and proper maintenance of switches and communications are essential and will minimize train delays.

Discussion

The discussion was opened by H. C. Fox (Sou.) with the statement that, on his territory, where the snow problem is not severe, the application of live steam from switch engines to switches along lead tracks has proved effective in removing snow. Replying to a question from the floor concerning the liability of fire or explosion when leaking tank cars pass over open-flame-type switch heaters, A. G. Reese (C. B. & Q.) stated that, during his long experience with such heaters, no

difficulties of this nature have been encountered.

C. E. Neal (S. P) discussed briefly some of the problems in fighting snow in the Pacific Coast mountain territory, where annual snowfalls in excess of 100 in. are common. He mentioned that he has found the Jordan spreader to be a valuable machine for clearing snow. He stated, further, that while switch heaters, including those ignited by remote control, are used wherever possible, at locations of heavy snowfalls it is necessary to station two men at each switch to keep it open. During heavy snowfalls when visibility is poor, these men work facing each other so that each is in a position to give the other warning of an approaching train.

In response to a request for information regarding the effectiveness of oil-pot switch heaters under varying conditions, A. B. Hutson (C. B. & Q.) stated that, judging by his experience at Galesburg, Ill., where 600 such pots are used at an interlocking, they are effective in quite heavy snowfalls provided the wind velocity is not high. During blizzards, however, the flame is frequently blown out, he said. G. M. Strawhun (M. P.) stated that, in parts of Kansas and Colorado, open-flame heaters can not be used because of the high winds which accompany snowfalls. Consequently, he said, it is necessary to rely on hand labor to keep switches open. To shelter the men assigned to this task, shanties with stoves have been provided at outlying switches. A question concerning the provisions that have been made for transporting the men to and from such locations was answered by W. Rambo (M. P.) who stated that, since it was impossible to use motor cars during snow storms, transportation by engines is provided.

Roadmasters' Section

Education of Track Employees in the Cost of Materials, Tools and Equipment

Report of Committee*

THE IMPORTANCE of this subject is brought to our attention forcefully when we consider that, of the $1,212,000,000 spent for maintenance-of-way work in 1947 by the Class I railroads of the United States, a total of $327,000,000 went for materials, tools and equipment. This latter figure, and the fact that prices are almost double what they were in 1939, clearly demonstrate the necessity for deep thought and extreme care in the handling and use by track employees of all materials, tools and equipment assigned to them.

To determine what steps are being taken by the various railroads to educate foremen or supervisors, who are the primary men in connection with the use of materials, tools and equipment in the maintenance-of-way department, a questionnaire was sent to a number of railroads operating in all parts of the United States in order to secure a good cross section of present practice. The questions asked were completely answered and discussed by representatives of 15 different railroads, and the answers given, with percentages based on these answers, are as follows:

E. L. Anderson
Chairman

Questions and Answers

Q. Do you now have a system of providing periodical publication of costs of materials, tools and equipment furnished to your maintenance-of-way forces, expressed in dollars and cents?

A. Yes—42 per cent on materials, 46 per cent on tools, 26 per cent on equipment.

Q. Do you now have a system of notifying your maintenance-of-way forces of costs of materials, tools and equipment, either by periodical publication or irregular notification, expressed in dollars and cents and/or by comparison?

A. Yes—53 per cent on materials, 53 per cent on tools, and 53 per cent on equipment.

Q. Where you have a system of periodically publishing, or issuing irregular notices of the costs of materials, tools and equipment to your maintenance-of-way forces, are such publications or notices sent only to the foremen or supervisors?

A. Yes—61 per cent on materials, 65 per cent on tools, and 50 per cent on equipment.

Q. Where publication or irregular notices of costs are used, are they being sent to all employees in maintenance-of-way departments?

A. Yes—7 per cent on materials, 7 per cent on tools, and 7 per cent on equipment.

Q. Whether you are sending out notices of costs in any manner or are not sending them out, do you consider that they should be expressed in dollars and cents?

A. Yes—100 per cent on materials, 100 per cent on tools, and 79 per cent on equipment.

Q. Whether you are sending out notices of costs or not, do you consider that the cost should be expressed in hours of labor as well as dollars and cents?

A. Yes—20 per cent on materials, 15 per cent on tools, and 15 per cent on equipment.

Practices Summarized

From the above it will be noted that much less than 50 per cent of the railroads answering have any regular periodical system of furnishing costs of materials, tools and equipment to track employees, while only 53 per cent are using any system of cost education. Moreover, a very small per cent of those that are sending out notices furnish the information to all employees. In general, all those who have given consideration to the program are of the opinion that the costs should be expressed in dollars and cents. This is true particularly in the case of materials and tools.

The information secured also indicates that, where costs are being furnished, they are, in the majority of cases, being sent direct to the foremen, with the expectation that he will pass the information on verbally to the employees under their supervision.

It was also found that, in general, where such information is being furnished, or is not being furnished, the foreman is charged with the responsibility for the proper use of materials and tools. However, in the case of equipment, 20 per cent of those answering the committee's questionnaire would hold the operator personally responsible for the proper use of the equipment.

All of the roads that are furnishing costs to their track employees report that the effect is very beneficial on their maintenance expenditures and that at least 85 per cent of all track employees react favorably to the practice. It has also been found that 85 per cent of the roads that have a program in effect feel that over-emphasis can be placed on such a program, resulting

*Chairman of this committee was E. L. Anderson, assistant chief engineer, St. Louis-San Francisco, Springfield, Mo.; vice-chairmen were C. G. Deppen, track supervisor, Reading, Pottstown, Pa., and C. T. Nix, roadmaster, Seaboard Air Line, Abbeyville, S.C.

in false economy in the use of materials and tools, and that this situation can be overcome only by proper supervision of supervisory officers above the rank of foreman.

In connection with the handling of such a program, our study reveals that there is a wide variety of thought as to who should be responsible for furnishing information and directing the program of education. Eight per cent would charge management with the responsibility, 15 per cent the chief engineer of maintenance-of-way, 31 per cent the division engineers, 15 per cent the roadmasters, and 31 per cent the supervisors above the grade of foreman.

A question regarding the discipline to be administered in cases of abuse and misuse of materials, tools and equipment revealed that 13 per cent were of the opinion that no discipline should be levied, while 87 per cent considered that discipline should be resorted to only in extreme cases and that emphasis should be placed on education and closer supervision.

A question designed to develop the attitude of railroad managements toward such a program revealed that 65 per cent are favorably inclined.

Several Unique Systems

It was found in the study that several railroads, while not proceeding under a program of education by publication and notices of costs, had rather unique systems of their own. For instance, one railroad operates a truck over each roadmaster's district twice a year, stopping at each section tool house to check up on the tools and supplies on hand. With the section foreman present, the roadmaster and supervisor of work equipment make a careful check of all tools, supplies and equipment repair parts at each section headquarters, and any excess items are placed in the truck and returned to the central or division store. It is reported that this scheme impresses upon the foremen, as well as the roadmasters, the importance of conserving materials, tools and equipment.

A second scheme that is followed is for the stores department to mark the price on all pieces of track material, tools, and equipment repair parts as they are shipped out to the various foremen. Through this practice the foremen and the men who use the items are constantly aware of their cost. In addition, the division engineers and track supervisors constantly discuss the economical use of materials, tools and equipment with the foremen.

A third system in use is for the chief maintenance officer to have regular meetings with the supervisory forces in his department, where the costs of materials, tools and equipment are outlined with the understanding that those present will, in turn, pass the information on verbally to the employees under their jurisdiction. In carrying out their part of the procedure, the supervisors endeavor to make the subject as interesting as possible to their men. Frequently they cite home expenditures, with which the men are familiar, to make clear what it means to the railway company to conserve and make economical use of materials, tools and equipment.

A number of other methods were disclosed for disseminating cost information to track employees, some of which are intended to bring out the rapid increases in costs in recent years. Others show what saving can be accomplished in dollars and cents by a few minutes labor. These methods, however, instead of being employed on a system-wide basis, are usually confined to some energetic roadmaster's or track supervisor's territory.

From the results of the study it is evident that only about one-half of the railroads are making any attempt to educate track employees properly in the economical and efficient use of materials, tools and equipment. Likewise, it is evident that in many cases the effort is not being directed by the higher officers in the maintenance-of-way department, and is not on a system-wide basis.

In carrying out any educational program regarding the cost of materials, particular stress, especially at the present time, should be laid not only on the high cost of new materials, but also on the large salvage value of metals. On almost any railroad property a check would indicate that hundreds of dollars are being wasted through failure to salvage such material. Likewise, it is doubtful that a very large percentage of track employees are conducting themselves always in such a manner as to secure the greatest possible service life from metallic materials, and also out of such other items as crossties, switch ties and all kinds of lumber.

Often, stored material is found that is not properly protected against theft. Also, metallic materials are frequently stored without first applying a preservative to prevent deterioration and oxidation, and lumber and ties are stored without proper protection against fire. No doubt such failure to take proper precautions is frequently due to the fact that track employees are not aware of the enormous value of the materials involved. Foremen should be advised of the value of the material comprising the track structure and should be impressed with their responsibility to see that the most effective and economical use is made of it.

Tools present a somewhat different problem from that of materials. The continued use of tools that are virtually worn out results in greatly reduced efficiency on the part of the workmen. Likewise, the use of inferior tools detracts from efficiency, and tools that are in bad condition or of poor grade are a hazard to the workmen and often result in personal injuries. Any discussion of the value of education in the cost of tools should give consideration to these factors, as well as to the proper use and care of the tools.

Equipment

In connection with equipment, it is very important that the track forces be advised of the investment in the machines assigned to them. Equipment can be seriously damaged by lack of proper lubrication and proper fuel, and by improper and careless usage. Most employees will be inclined to watch these items more closely if they are aware of the investment involved in the equipment. In addition, it is very important that employees be made aware of the cost so that they will have a conception of the loss that is incurred when the equipment is made idle because of damage or breakage due to inefficient or abusive handling.

It is necessary that those who use equipment be carefully instructed in its proper care and use. In the last few years the use of power equipment by the maintenance-of-way forces has increased so rapidly that intelligent and efficient instructors and supervisors have not always been available to instruct properly the men who make use of the equipment. From the committee's study of this subject, it is evident that the education of employees in the proper care and use of equipment and in the cost of equipment are related subjects.

As a result of its study, your committee has arrived at the following conclusions:

(1) It is evident that in only a few cases have railroads a consistent and effective policy or program for disseminating information as to the cost of materials, tools and equipment to the track department.

(2) In general, even where programs are being carried out, information is not furnished to all employees concerned.

(3) Generally speaking, the information is not put out in an attractive manner so that it appeals to all employees in the track department.

(4) Most track department employees give little thought to the cost of materials, tools and equipment because such items are simply furnished to them by the stores department on order without any information as to their value.

(5) Almost all railroads have a well-defined safety program and a well-organized safety department. These departments have accomplished remarkable results in the way of education through the use of bulletins, meetings and programs, often accompanied by action pictures. It is evident that similar programs for educationg track employees in the costs of materials, tools and equipment would be equally effective, and that the expense would be justified.

(6) Foremen, in general, are not conserving materials, tools and equipment as they should. Lack of a proper conception of costs by foremen, who are the key men among the track forces, is largely responsible.

Recommendations

The committee offers the following recommendations:

(1) That a program be inaugurated on each and every railroad by the highest officer in the maintenance-of-way department to educate all employees responsible for the actual use of materials, tools and equipment in the cost of these items.

(2) That this program be made interesting by eliminating long statements of dry statistics as to the costs of various items, substituting therefor periodical statements comparing the costs of principal items of materials, tools and equipment with personal items purchased by the employee with his own wages. This program should be varied from month to month and should be stressed through conferences and meetings of supervisors with their foremen and men.

(3) That the detection of any misuse of materials, tools and equipment be handled in an educational and instructive manner,

and that discipline be used only as a last resort.

(4) That such a program be in charge of an officer designated by and working under the supervision of the highest officer in the maintenance-of-way department, who is familiar with all costs, the proper use of materials, the efficient use of tools, and the economical use of equipment—and that sufficient force be assigned to carry on the program systematically and efficiently. This organization should work with roadmasters and supervisors in presenting the program to the track forces.

(5) That careful selection be made in promoting foremen and in hiring laborers, endeavoring to secure men who will readily fit into an educational program.

Discussion

R. L. Fox (Sou.), opening the discussion, said that he plans to make a list showing the cost of various items of track material and their value as scrap, for distribution among his men, and to stress clean-up campaigns and the salvage of materials.

F. B. Kelly (M. St. P. & S. S. M.) stated that he gives information to trackmen on the cost of tools and constantly stresses the conservation of tools and materials including ties. To avoid damage to ties and waste of material, no more spikes than necessary should be used in shimming track, he said.

N. F. Albert (C. M. St. P. & P.) expressed the opinion that maintenance officers should go into the field and educate trackmen in the use and conservation of tools and materials. This, he said, is better than issuing bulletins. O. H. Carpenter (U. P.) said that his policy is to disseminate information on the cost of tools and material. He also instructs foremen not to hold material that is not needed and to use needed material when it is received. A. G. Reese (C. B. & Q.) agreed with Mr. Carpenter and stated that material should be re-distributed between sections when necessary.

Chairman Anderson, in answer to a question by President Chaney, stated that the best way to conserve tools and material is to have some one thoroughly familiar with the problem talk to trackmen on costs and methods of conservation. C. E. Neal (S. P.) agreed with Mr. Anderson and thought that consideration should be given to painting the costs on some of the larger items, such as frogs, switch points, etc.

Use of Work Equipment at Derailments and in Coping with Other Emergencies

Report of Committee*

THE development of work equipment in recent years has brought about its more extensive use at derailments, washouts, fires, and other emergencies where track and right-of-way must be opened for traffic with minimum detention. Few roads have made systematic use of their machinery for this purpose, although the benefits to be obtained by advance planning for such use have been pioneered and proven valuable by a few roads in this country and were proved valuable by the Military Railway Service during World War II. More often the use of work equipment in emergencies has been more of an improvisation by the local supervision. This improvisation is commendable, but planning for the use of equipment before an emergency occurs will produce greater savings in time and expense and will lead to more extensive use of the available machinery.

Of first importance is a plan for making the equipment available. When a program for the use of work equipment at emergencies is put into operation, specific instructions should be placed in the hands of everyone in all departments who will be concerned with carrying out the instructions. Responsibility should be clearly defined. Each man must know what is available at each point and how it may be obtained for use. In alloting responsibility it would be well to keep in mind that the supervision to be directly in charge of the work in the field should not be burdened with too much responsibility for minor details, but rather, should be left free to organize the general plan for restoring the tracks. The details

P. S. Settle
Chairman

of placing men and equipment on the job can be left to the men in charge of each unit if these men have been properly trained and understand their duties. Thus the field supervision will be free to proceed immediately to the scene of the emergency where their judgment and qualifications may be used to the best advantage in estimating what will be required to restore the line to service and in organizing and supervising the work itself.

Ample records should be maintained so that the machinery can be quickly located. Some larger roads have found that the preparation of booklets listing personnel and equipment will reduce time consumed in moving the machinery to the emergency. It is also recommended that outside sources of men and equipment be contacted in advance, and that arrangements be made for securing their services in emergency. This applies to all departments of the railroad as well as to local contractors and others who have men and equipment that may be needed. For example, the maintenance of equipment department car shops are able to furnish acetylene cutting torches, chains, etc. One road found that it was to its advantage to maintain a list of garage mechanics at outlying points who could be called upon in emergency for acetylene torches and tow trucks. This arrangement has reduced time in clearing track where side rods or brake rigging had to be cut free, or wrecked automobiles removed, as well as provided an additional source of cutting torches where the demand was greater than could be met with company-owned equipment.

It is essential that several men be qualified to operate each machine so that an operator can always be obtained quickly and his relief assured. These men and their immediate supervisor should be familiar with the capabilities of the machines. With much of our work equipment, particularly bulldozers, the field of usefulness seems limited only by the ingenuity and skill of the operators and supervision. Upon them rests the responsibility for successful use of the equipment.

Must Be Kept in Readiness

Equipment must be held in such a manner that it can be quickly transported. It is recommended that equipment frequently used for emergencies and working at an outlying point be left adjacent to a road at night whenever possible, so that it will be in position for quick movement by truck. Cranes, bulldozers and other equipment

*Chairman of this committee was P. S. Settle, track supervisor, Pennsylvania, Perryville, Md.; vice-chairmen were J. R. Murray, roadmaster, Denver & Rio Grande Western, Green River, Utah, and E. F. Saum, assistant engineer, New York Central, Erie, Pa.

Three representatives from the Richmond, Fredericksburg & Potomac wait for one of the sessions to start. They are (left to right) L. B. Cann, Jr. engr. aide; J. C. DeJarnette, Jr., div. engr.; and J. A. Blalock, asst. div. engr.

moved exclusively by rail should have assigned flat and tool cars, equipped with loading ramps, immediately available at all times. Similarly, the accessories for each machine should be kept in an assigned box with the machine so they can be readily loaded into trucks or cars for movement to the scene of the emergency with minimum delay and with the assurance that everything necessary for operation will be available on arrival. Emergency tools also should be kept at a central point in tool boxes so they will be ready to load when the men arrive. At this same location it would be well to have on hand the other equipment and supplies most frequently required, such as acetylene cutting torches, an ample supply of acetylene and oxygen, portable lighting equipment, retrackers, blocking, etc., so they may be moved in conjunction with the men.

Work equipment adaptable for wrecking purposes only supplements the wreck derrick. Usually, when an emergency occurs the railroad is either out of service or so congested that work equipment cannot be moved to the scene by rail until after the greatest opportunity for its use has passed. It is highly desirable, therefore, that work equipment be able to move over the highways. In this manner it can be put into operation hours before it would be possible, otherwise, and in many cases will be able to clear the track before the arrival of the wreck train. During most emergencies off-track work equipment is best used at intermediate points beyond the reach of the wrecking derricks. By so using the equipment, the time required to open the line to traffic can be greatly reduced.

At least one large road is using off-track equipment at derailments and other emergencies in accordance with a carefully thought-out scheme designed to place the most useful equipment on the site of the emergency in minimum time. The machines used are crawler tractors equipped with angle dozing blade and winch, and highway truck-mounted cranes of 20-ton capacity. These machines are currently used for ditching, grading and structural work, but are subject to call at all times in the same manner as the wreck train. The division man responsible for dispatching the wreck train to emergencies is also responsible for dispatching the off-track equipment, and he is kept advised at all times of its location and how the operators can be contacted.

The bulldozer is loaded at the end of each day's work on an assigned truck-tractor trailer unit in readiness for immediate movement. Arrangements have been made with the state authorities for emergency moves without first securing hauling permits, and also for police escort if necessary. Special maps have been prepared showing routes to various points on the line and all local roads to and along tracks. They also designate points on main routes at which a local man will meet the equipment to pilot it to the point of trouble, as the equipment is used over several divisions where the operators are not familiar with the secondary roads. These charts also show restricted points where special care must be exercised because of clearance or weight limitations. This plan does not eliminate the use of equipment available locally, but it does assure having useful machines available everywhere for use in emergency. The use of these machines according to plan has been effective and the cost of putting the plan into operation has been fully warranted.

One of the first requirements at any emergency is adequate communication facilities. Portable telephones should be dispatched and set up at the location of trouble as soon as possible. The number of phones used depends on the amount of work to be done, but enough phones should be furnished to allow all phases of the work to progress without delay due to lack of communication. It is especially desirable to establish direct lines to movement directors and division officers who must be kept currently advised of the progress made if they are to use their authority to the best advantage. Some railroads have portable switchboards which may be set up for any large operation and operated by the local communication department employee. Placing telephones in charge of such an employee assures that connections will be maintained and also provides means of contacting men at the location.

Some roads have acquired portable, battery-powered loud speakers for use at large routine maintenance operations for giving instructions and maintaining contact, and have obtained good results from their use. From a safety standpoint they are of value for warning workers and others of approaching trains and of areas that are dangerous because of the work in progress. These loud speakers have been put to similar use during emergency operations, such as derailments, bridge fires, etc., with considerable success. When used for both routine and emergency work, their cost is justified by improved coordination of the various units involved and the additional safety protection provided.

Illumination

Illumination of night work is an essential factor for safety and efficiency. Many roads have found that battery lights with automotive headlamp-type reflector are of great benefit for minor trouble ordinarily corrected by a small force, and of short duration, as well as for the inspection of hillsides and pole lines, and as a motor car headlight. These lights are very useful at the type of emergencies covered by this report, but cannot provide the illumination required in most cases.

Electric floodlights are the best and safest source of illumination at points of emergency and should be used instead of carbide water lights, particularly if the emergency will be of some duration. Carbide water lights should be stocked locally for quick usage, but should be limited to providing illumination only until electric floodlights can be put into operation.

Most roads are not making efficient use of the sources of electric power already available in so far as floodlighting is concerned. Here again there is need for a plan to be worked out by the individual roads for using electric tie tamping unit generators and bridge and building department power tool generators as sources of power for floodlighting at emergencies. If we are to make full use of these machines, the floodlights, or strings of light bulbs in sockets on a line of twisted pair should be kept in special boxes with these machines ready for immediate movement to and mounting at the scene of the emergency. Tripod stands, brackets for attaching to poles, or other mounting devices should be included in the emergency box for sup-

Shown here are (left) Frank Meyer, formerly ch. engr., N.Y.O.&W., now Philadelphia Steel & Wire Co.; and I. D. Talmadge, rdm., L.&H.R.

porting lights high enough to give the best illumination. With adequate floodlighting the work can be carried out more safely and quickly than otherwise.

Bulldozer Versatile

Probably the most useful single piece of off-track work equipment at derailments and other emergencies is the bulldozer. Its value was strikingly demonstrated during the operations of the Military Railway Service in World War II and it was frequently referred to as their "secret weapon". Railroads in this country are using the bulldozer to advantage; some with more success than others, but in most cases the field is wide-open for improvement. With this machine a plan for its use is of first importance, as the greatest opportunities for its use exist in the early stages of most emergencies and are lost unless the machine is readily available.

The means of transporting a bulldozer depends entirely upon the terrain of the area in which it is located. Where it must be moved by rail, a flat car with loading ramp should be kept with the machine so that it can move as a part of the wreck train or in a separate train. If highways provide ready access to most parts of the territory, a more flexible arrangement is to provide a flat-bed trailer.

In this connection it is well to keep in mind that too much economic loss arises from purchasing dozer equipment for wrecking purposes only. It must be kept busy on maintenance work throughout the year. Although a bulldozer is used usually as a supplement to the wreck derrick, it can provide immediate availability at outlying points remote from a wreck derrick located at a central point. Thus its use in maintenance work at outlying points often will be more advantageous from an emergency standpoint than if it were located centrally. The flat-bed means of transporting bulldozers fits this arrangement best because it can be kept with the machine while rail-bound power must be kept at a central point. The flat-bed can also take the bulldozer cross country from one line to another, making a short highway haul where a long rail haul would be necessary otherwise. If a highway is not adjacent to the scene of emergency, the bulldozer can be moved to the scene on the track.

Most roads will find that a saving can be made by owning an assigned flat-bed trailer for each bulldozer in wreck service, preferably powered by a truck tractor rather than towed by auto truck. Rental charges for flat-beds will usually exceed the annual cost of company-owned equipment and rented trailers are not generally as readily available in emergency. Then, too, there are many uses of the flat-bed at derailments and for ordinary maintenance work besides moving bulldozers.

Flat-beds Useful

One of the maintenance-of-way department's biggest problems at most derailments is getting rail and other heavy material to the location. Flat-beds are one of the best solutions to this problem. After unloading the bulldozer at the emergency they can return to the material yard for material, or, as is more often a better arrangement for time saving, can be used to move rail, ties and other heavy track material from a work train located clear of the wrecking operation to the location where they are to be used.

Flat-beds are also useful in handling other types of work equipment, such as cranes, track and crawler-mounted compressors, electric tie tamping units, etc. Used together with truck-mounted cranes, or crawler cranes on the ground, an ingenious supervisor will be able to keep abreast of the material and equipment demands at an emergency. By using this combination it has been possible to restore a main-track interlocking in high-speed, heavy-traffic territory for scheduled speed without having a work train place a single piece of material within the limits of the interlocking.

Any type or size of bulldozer is useful at emergencies, but one with crawler treads and an angle dozing blade, of a size commonly referred to as Class B tractor and of approximately 100 hp., is recommended. To realize its full usefulness, it should be equipped with a heavy-duty winch and at least 100 ft. of 1-in. cable.

Roadmasters' Section

The bulldozer is a useful piece of equipment at derailments and other emergencies

Bulldozer Uses

Upon arrival at the emergency, many tasks await the bulldozer and these tasks are best accomplished and the machine's maximum usefulness realized when its work is coordinated with that of the other wrecking units under the general supervision of the wreckmaster in charge. The important uses of the bulldozer in emergencies are as follows:

(1) Cars not derailed may be moved away from the derailment to make room for wrecking operations, keeping in mind that crawler treads may cause damage to the track and to use blocking or ballast when crossing the rails.

(2) Derailed equipment can be pulled clear. It is best to use the winch and cable, moving the bulldozer only when the capacity of the winch is exceeded. Cars can be rolled over by using a rolling hitch on the cable. A pair of bulldozers working together have rolled locomotives to clear or into pits previously dug by the dozers for this purpose.

(3) Using retrackers, bulldozers can re-rail cars. They are especially useful in straightening trucks in preparation for retracking.

(4) Working with wrecking derricks, bulldozers can move cars which are beyond the reach of the derricks, clear space for the derricks to place wreckage, and move car trucks and smaller fragments of wrecked equipment.

(5) One of its most valuable fields of usefulness is in removing spilled lading, such as coal, ore and cinders. Material of this sort that would otherwise require an army of men with hand tools hours to remove can be handled in a matter of minutes with a bulldozer. It can also clear a space for spilled lading to be placed so that salvage will be easier and more thorough.

The Great Northern was represented (left to right) by W. B. Jensen, mot. car reprman.; F. A. Chinquist, div. rdm.; C. Halverson, div. rdm.; L. B. Franco, div. rdm.; R. R. Manion, engr. m. of w.; J. A. Sullivan, div. rdm.; V. C. Hankins, div. rdm.; Earl T. Frenzen, struct. engr.

(6) Where the track and roadbed is badly torn up, the bulldozer is often used to remove the badly broken ties and twisted rail, and to smooth the roadbed preparatory to laying new ties and rail. Frequently this work can be done at an intermediate point clear of wreckage while the wreck derrick is working on wrecked equipment at the ends. The bulldozer is also valuable in dragging rail to the intermediate point, or for clearing a road so that trucks may bring in the rail and other necessary material.

(7) In some cases it may be to advantage to use the bulldozer to grade a temporary roadbed around the wreck. After the wreck has been cleared, this temporary run-around track can be pushed into final line by the dozer. Using this same idea portions of a two-track line may be shifted to form a single track railroad through the derailment. Similarly, panels of track may be constructed in the clear and pushed into position by the bulldozer when the roadbed has been cleared.

In emergencies other than derailments the bulldozer is a valuable tool, but in most cases the work is less spectacular than at derailments and the machine is used in a routine manner. For instance, the debris following a fire can be readily moved to clear with the blade or pulled with the winch line. It can generally be used to advantage at landslides, although the amount of bulldozing that can be done on the track structure itself is limited by the damage that the caterpillar treads can do to the track and the difficulty of maneuvering the machine over the rails. If cranes are used to cast the slide material clear of the track, the bulldozer may be useful in disposing of it and keeping a space clear for the cranes to work. Where the slide is of large rocks, the winch line on a bulldozer can pull them to clear.

The bulldozer can also be used to push the track back into line after the slide has been removed. For restoring the roadbed after a flood or washout, it is used to handle filling material, either by bulldozing or pulling carry-alls. Where a large volume of filling material has to be handled, rubber-tired earth-carrying equipment is most effective, especially where a long haul is necessary. Along this same line, the purchase of rubber-tired dozers equipped with winches for use at emergencies has been considered because of the ability of these units to move over highways under their own power and to move over rails and other obstructions with greater ease and less damage than the crawler type. No material on the use of this machine is available for this report.

Other Equipment

Small, track-mounted, self-propelled cranes of the rail-laying type are always useful where track work is to be done. Their use at derailments and other emergencies is limited by the amount of track occupancy available. They have the advantage of requiring a smaller space in which to work than a work train. Because of their size they are generally confined at emergency jobs to doing the work for which they are ordinarily used, and with which you are all familiar.

Auto trucks are one item of equipment that are always available—either company owned or rented. They are more or less taken for granted by many, and for this reason their full capacity is often not realized. The various uses of trucks are generally known, but much can be done to improve their usefulness and availability. A plan for calling men in emergencies and for collecting them at central points will save valuable truck time, as will a plan for having emergency tools kept in tool boxes on platforms so they can be quickly loaded when the men arrive. It is also recommended that trucks carry chains, tow ropes and other accessories to enable them to overcome ordinary causes of delay. Trucks equipped with winches are able to handle heavier material than would otherwise be possible, and have been used to supplement cranes and bulldozers in removing debris and wreckage.

Highway truck cranes, ordinarily used for off-track ditching and bridge and building department work, can be used at emergencies. Working by themselves or with bulldozers they can handle debris beyond the reach of the wreck cranes. They are also being used in cities to retrack cars in yards or on industrial tracks where a considerable saving can be effected over the cost of a wreck train; also at those locations where the wreck train cannot be used to good advantage.

The limitations of this report preclude discussion of the use of all types of work equipment at emergencies. It is hoped, however, that the material presented will arouse the curiosity of those for whom it is intended, sufficiently to cause them to consider how all of their work equipment can best be used at derailments and in coping with other emergencies.

Discussion

A. G. Reese (C. B. & Q.) started the discussion by asking the chairman what arrangements are made for calling the operators in case an emergency arises outside of working hours. Chairman Settle replied that it was usually customary for the superintendent's office to call the track supervisor who, in turn, called the equipment operator and his helper.

E. L. Banion (A. T. & S. F.) stated that, in the past, there had been objections raised to the purchase of off-track equipment solely for emergency uses. He said that he was glad the report stated that such equipment must be kept busy in maintenance work throughout the year.

In reply to a question from the floor, Chairman Settle stated that work equipment could be effective for emergencies arising in a territory extending a little more than 200 mi. from headquarters. He said he knew of instances where such equipment had been moved 175 mi. to the scene of an emergency.

I. D. Allender (K. C. S.) said that he advocated the use of contractors' equipment on railroads which, because of infrequent need, could not justify the purchase of machines solely for use in emergencies. President Chaney, S. C. Jannotti (Penna.), and A. E. Botts (C. & O.) told of their experiences with the use of contractors' equipment at derailments at which three to five hours were saved in restoring tracks to service.

G. L. Sitton (Sou.) remarked that he was glad to have the information given in the report about flat-beds to use as an argument for getting some of that type of equipment on his railroad. A. H. Whisler (Penna.) warned that too much emphasis could not be placed on educating operators in the correct use of crawler equipment at derailment to prevent them from losing their tracks.

The discussion was closed by C. C. Chism and R. A. Hostetter (both T. & N. O.) who spoke of the advantages of having bulldozers of the larger sizes at emergencies.

Reducing Rail Joint Maintenance

Roadmasters' Section

Report of Committee*

R. R. Manion
Chairman

THE maintenance of rail joints and other elements of the track structure affected by the rail joints remains one of the major items of expense in track maintenance after nearly 120 years of railroading. The service life of the rail, and a good portion of the service life of the ties (12 to 16 per cent) and ballast are affected by joint conditions. Accordingly, their life will be extended or reduced by the standard of maintenance at joints. Anything affecting the service life of track materials not only involves the investment in the material itself, but also the very considerable item of labor required to place and remove it. It has been estimated that 50 to 70 per cent of all work done on track is related to joints. In view of this and the constantly increasing cost of labor and material, the subject assigned to this committee is one of great importance.

Reducing the cost of rail joints maintenance begins with the proper design of the joint, followed by correct installation and preventive maintenance of the joints.

The first requirement for rail joints, in order that they may be properly maintained, is that they be designed for the traffic and other conditions to be encountered. Rail joints should have as nearly as possible the same physical properties as the remainder of the rail in order that their action under load will be the same as in the rest of the rail — thereby creating no condition that will require special attention or extra maintenance. With the higher rail sections now in use, joint bars are available which produce joints having more nearly the properties of the rail. Recent service tests indicate that for the higher rail sections, 36-in. bars give substantially longer and better service than 24-in. bars, and materially increase the life of the rail. Furthermore, it is the experience of maintenance men using both types of bars that joint maintenance is reduced with the longer bars.

Present bolt standards seem to be adequate and no cause of excessive maintenance. On the other hand, recent tests of spring washers have developed that wear on bars and rail at joints, and the maintenance item of bolt tightening, can be reduced, and joint conditions improved, by the use of spring washers having a higher reactance than was formerly required. There is some disagreement among maintenance men on this point, but your committee believes that joint maintenance will be reduced by the use of spring washers of the high-reactance type.

Opinion is divided also as to supporting or suspending joints, or spacing ties evenly throughout the length of the rail, without regard to their location with respect to the joint. It is the opinion of the majority of this committee that a uniform spacing of ties throughout the length of the rail, without regard to their location at the rail ends, provides adequate support and promotes the greater economy. In connection with tie spacing, it is strongly recommended that all anchorage be provided on the rail away from the joint, and that joints not be slot spiked. The slot spiking of joints, in addition to causing the ties to move, disturbing the surface and line, places stresses on the joint structure which increase maintenance by causing wear and sometimes breakage of the bars.

In considering joint design, mention must be made of the economies which may be obtained by reducing the total number of joints. Inasmuch as the cost of maintaining joints will vary as the number of joints, economies will result from reducing the number of joints up to the point that it is practical to increase the length of rails. This was done when rails were lengthened from 33 ft. to 39 ft. At such time as sufficient equipment becomes available for transporting longer rails, and providing the longer sections may be procured without payment of premiums, 45-ft. or longer rails should be used. Pursuing this line of thought introduces the possibilities of continuous welded rail, which your committee recognizes as being a possible solution to the problems; however, consideration of continuous welded rail is not included in the assignment of this committee.

However well designed and carefully manufactured joint bars may be, excessive maintenance will result if they are not installed properly. When the bars are applied, both they and the rail ends must be free of dirt, grit or scale so that a proper fit will be obtained and excessive wear avoided. The correct lubricant should be applied in sufficient quantity to the rail to cover the contact surfaces and protect the entire joint area against corrosion. Maintenance men are not in complete agreement as to the type of lubricant to be used or how it should be applied, but it is generally agreed that the greatest benefit derives from applying the lubricant to new joints before installing the bars. The use of packing enjoys considerable favor, and a type should be used which does not absorb or hold moisture. Under particularly severe conditions of abrasion, such as in desert country or on grades and in yard tracks where sanding is heavy, the life of joint materials can be greatly prolonged by the packing and sealing method.

Great stress should be placed on installing joint bars correctly to avoid "cocking". One of the principal advantages of the head-free type of bar is that it applies easily without any tendency to cock. Where full-bearing bars are used, it is recommended that the two center bolts be tightened first to insure proper bearing. Maintenance men are unanimous in emphasizing the importance of obtaining uniform bolt tension when assembling the joint, and it is recommended that the initial tension be between 15,000 and 20,000 lb. Tension in excess of 20,000 lb. is liable to damage both the bars and the rail. The use of mechanical bolt tighteners permits greater uniformity, but they should be checked frequently to insure proper adjustment. As soon as traffic has seated the bars—probably in two weeks—the bolts should again be tightened to approximately 20,000 lb.

Of prime importance is the support of the joints. Upon laying the rail, all swinging joint ties must be tamped up to avoid damage to the bars and rail ends. This should be done promptly. To avoid damage and excessive joint maintenance expense, the ballast at joints must be clean, well drained, and fully tamped up, and a good subgrade condition must exist. Due to the fact that there is impact at the joints, the tamping of joint ties must be especially well done, drainage must be maintained, and any deficiencies in subgrade corrected. In general, to provide the quality surface required to protect the investment in new rail, an out-of-face lift is required, and this should be done as promptly as is practicable. Some roads, in fact, now favor making the lift and lining ahead of the rail laying, following up with whatever spotting is required after the rail is laid.

In laying the rail, care must be exercised to provide uniform space between rail ends for expansion, and to leave no greater space than is necessary. It has been found that in locations of only slight temperature variation, much batter and joint maintenance can be avoided by laying the rail with the ends butted up tight. Sufficient anchorage must be applied to the rail before the passage of any trains in order to retain uniform expansion spacing. Excessive opening at the rail ends magnifies the impact from passing wheels, resulting in batter, damage to the bars, rail ends, ties and, finally, the ballast and roadbed.

*Chairman of this committee was R. R. Manion, engineer maintenance of way, Great Northern, St. Paul, Minn.; vice-chairmen were W. H. Haggerty, track supervisor, New York, New Haven & Hartford, New Rochelle, N.Y., and M. L. Denney, general superintendent, American Railway Engineering Company, Indianapolis, Ind.

A group from Colorado and other points west, including (left to right), W. S. Broome, asst. ch. engr., Colo. & Sou.; W. C. Oest, prin. asst. engr., F.W.&D.C.; S. K. Autrey, b. & b. & w.s. insp., Burl.-Rock Island; P. F. Huston, mast. carp., Colo. & Sou.

To minimize the effect of wheel impact, and reduce the expense of rail-end welding, bar changing and bolt tightening, new rail should be end hardened. Rail may be end hardened in the field or at the mill. Which method is preferable is a matter open to discussion. Any advantage which results from more careful control in the mill process may be offset by lower costs in the field process. It has been customary to do the field hardening following several weeks' service of the new rail in order to obtain the benefit of the cold rolling of the wearing surface. However, there is a general belief that equally good results are obtained by applying this process immediately upon laying the rail, and thereby avoiding the initial batter which otherwise would result.

Field end hardening has the disadvantage of destroying or damaging some of the lubrication applied to the joint when installed, and it is difficult to avoid damage to rail-head-type bond wires where used. Good supervision of the field process must prevail to obtain uniform results and to avoid obtaining hardness much above 400 Brinell. In favor of the method of end hardening after several weeks' service of new rail, and an advantage for the field process, is the fact that inequalities in rail height sometimes require surface grinding of rail ends. When this is desirable the grinding should be done after the second bolt tightening and before the end hardening.

Preventive Maintenance

Under the action of rolling loads, the metal on the top of the head is caused to flow at the rail ends. If no action is taken to offset this, the closing of the rail-end gap due to expansion and the flexing of the joint will result in chipping of the rail ends and require welding to reduce pounding and save the joint. This is an unnecessary expense, which can be avoided by slot grinding the joints before the flow becomes critical.

After the first and follow-up tightening of the bolts, it is necessary to retighten the bolts periodically to compensate for wear, stretch, etc. This is most important. Out-of-face bolt tightening can be accomplished with machines at relatively low cost and, if done before the joints are permitted to become loose, prevents much unnecessary wear, batter and spot surfacing. The bolts should be tight before any out-of-face surfacing is done. The effective life of the rail and bars will be lengthened by the maintenance of good bolt conditions and joint surface.

Where joint batter occurs, economies will result from building up the rail ends by welding and grinding before the amount of batter becomes serious. Before doing the welding, of course, bolt and surface conditions must be corrected so there will be no attempt to weld out irregularities due to loose bolts or low joints. It is generally recommended that batter should be corrected when it amounts to 0.025 in. to 0.035 in. If these limits are much exceeded before corrective action is taken, the expense becomes excessive due to the size of welds required and the number of damaged bars it will be necessary to renew in connection with the welding. In surface and cross grinding, care must be exercised not to burn the rail, as this will cause heat stresses which may also result in chipping.

Expensive joint maintenance is not confined to main tracks. Some of the greatest neglect, damage, and resulting expense takes place on switching leads and yard ladders. Careful planning and the practice of carrying out preventive maintenance will pay big dividends on these tracks.

To reduce the cost of joint maintenance of relaid second-hand rail, many roads crop the rail to obtain unbent rail ends with the equivalent of new fishing surfaces. Careful study must be made of such a practice, however, to insure its economy, determining all the costs involved, whether it is economical to provide new or reformed bars, and considering the added number of joints that will result from the procedure.

The importance of lubricating and preventing the corrosion of rail joints has been demonstrated by field and laboratory tests conducted by the American Railway Engineering Association. These tests gave evidence that corrosion was a major factor in causing joint wear and the occurrence of frozen joints. It was concluded that the recurrence of the cycle of corroding of the contact surfaces and wearing off of the rust accelerated the joint wear. To provide the required lubrication and protection against corrosion it is necessary to renew the protective material when the previous application ceases to be effective. Several methods of applying such a material to joints without disassembling them have been developed. These include pumping into the fishing space through seals already in place, and power spraying on and into the joint a warmed oil and protective compound. In addition to preventing joint wear and frozen joints, these methods greatly extend the life of bolts and reduce their loss through breakage on retightening.

To realize the reduction in joint mainte-

The maintenance of rail joints remains a major item of track maintenance expenses

nance possible through the correct installation of properly designed joints and the practice of preventive maintenance, the track forces must be well trained in the performance of their work. Careful inspection and planning are required to obtain the greatest economy from the retightening of bolts, slot grinding, rail-end welding, and bar-changing programs, so that developing conditions are arrested before becoming critical and causing unnecessary expense. The roadmaster or supervisor, being in direct charge of the track and the track forces involved, has the responsibility and the opportunity to accomplish this training, inspection and planning.

Conclusions

The cost of rail joint maintenance may be reduced if the rail, joint bars and fastenings are designed as near as may be to fit the traffic involved, and the track forces are trained properly to apply the joints and take care of them. Obtaining in the first instance a tight, well fitting and well supported and lubricated joint, with equal rail heights, then maintaining good bolt conditions, good support, free movement within the bars, adequate anchorage, and correcting flow and batter before they become serious, will avoid the high expense of shortened rail life, bent and broken bars, damaged and missing bolts, and excessive surfacing. Providing a lubricant and protective coating, and maintaining their effectiveness both to prevent wear and to avoid the loss of material through corrosion, prolong the life of the joint materials and reduce the labor cost of replacing them. The training and supervising of the track forces necessary to attain these results, and the inspection and planning required to insure their timeliness, are important duties of the roadmaster.

Discussion

F. B. Kelly (M. St. P. & S. S. M.) opened the discussion by saying that he agreed with the committee that 36-in. bars are superior to 24-in. bars in holding the joints to proper surface. He also stressed the importance of maintaining the whole track structure, including ballast, in good condition as a means of preserving rail joints, stating that foul ballast causes worn joints. Moreover, he said, the joints should have spring washers of adequate strength and the rail should be properly anchored.

C. Halverson (G. N.) said that since long joint bars were introduced on his road the expense of maintaining joints had been reduced. O. H. Carpenter (U. P.) expressed the opinion that the use of long bars on sharp curves helps to maintain alinement and to reduce rail breakage within the angle-bar areas.

G. M. Magee (A.A.R.), in answer to a question, stated that the design of the spring washer is based on once-a-year tightening of joint bolts. He also stated, in answering a question by R. L. Fox (Sou.) that there is no machine that will determine accurately the tension in a bolt. He advocated the practice of tightening a bolt by a hand wrench to the desired tightness and then setting the power nut runner to trip at that tension.

Two Supply Groups Hold Exhibit and Annual Meetings

OCCUPYING all available space in the exhibit hall of the Stevens hotel, the third joint exhibit of the Track Supply Association and the Bridge and Building Supply Men's Association was held during the concurrent conventions of the Roadmasters' and Maintenance of Way Association and the American Railway Bridge and Building Association at Chicago, on September 20-22. With 93 companies participating, the exhibit consisted of an attractive and effective display of materials, equipment, devices and services offered for use in the construction and maintenance of railway tracks and structures. A complete list of the exhibiting companies, showing the products displayed and the representatives present, was published in the September issue.

Kenneth Cavins
President-Elect, Track Supply Association

G. R. Betts
President-Elect, Bridge and Building Supply Men's Association

The officers of the Track Supply Association who were responsible for the planning and conduct of the track portion of the exhibit this year were: president, J. B. Templeton, Templeton, Kenly & Co., Chicago; first vice-president, Kenneth Cavins, Fairmont Railway Motors, Inc., Chicago; second vice-president, R. W. Torbert, Oxweld Railroad Service Company, Chicago; and secretary-treasurer, Lewis Thomas, Q & C Company, Chicago. Directors of the association were: A. B. Chaney, assistant engineer maintenance of way, Missour Pacific, St. Louis, Mo., (honorary); H. M. McFarlane, O. F. Jordan Company, East Chicago, Ind. (ex-officio); W. A. Maxwell, American Brake Shoe Company, Ramapo Ajax division, Chicago; W. A. Enstrom, Pettibone Mulliken Corportation, Chicago; S. W. Hickey, *Railway Engineering & Maintenance*, Chicago; W. A. Peck, The Rails Company, Chicago; and S. P. Murphy, Sperry Rail Service, Chicago. Mr. Thomas served as director of exhibits for both of the associations.

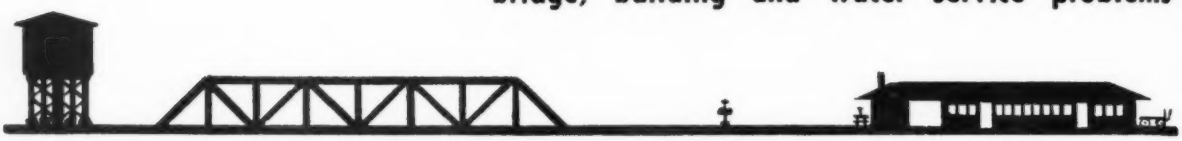
The officers of the Bridge and Building Supply Men's Association who arranged for the exhibits of the members of their association were: president, Howard Mull, Warren Tool Coporation, Chicago; vice-president, G. R. Betts, Armco Drainage & Metal Products, Inc., Chicago; treasurer, S. W. Hickey, Chicago; secretary, E. C. Gunther, Duff-Norton Manufacturing Company, Chicago. Directors were: W. Lyle McDaniel, Massey Concrete Products Company, Chicago (honorary); C. E. Croisant, The Lehon Company, Chicago; R. W. Torbert; R. R. Clegg, American Lumber & Treating Co., Chicago; H. R. Duebel, Chicago Pneumatic Tool Company, Chicago; and L. R. Robinson.

Both of these associations held their annual meeting on Wednesday, September 22. In the election of officers of the Track Supply Association, Mr. Cavins was advanced to president and Mr. Torbert to first vice-president; Mr. Peck was transferred to second vice-president, and Mr. Thomas was re-elected secretary-treasurer. New directors elected for a term of two years are: A. J. Reading, Chipman Chemical Company, Chicago; W. B. Blix, Nordberg Manufacturing Company, Milwaukee, Wis.; and R. W. J. Harris, The Rail Joint Company, Inc., Chicago. S. P. Murphy, Sperry Rail Service, Chicago, was elected a director to serve for one year, and Mr. Templeton becomes a director ex-officio.

In the election of officers of the Bridge and Building Supply Men's Association, Mr. Betts became president; Mr. Hickey was elected vice-president; Mr. Gunther was re-elected secretary; and Mr. Clegg was elected treasurer to serve in addition to his position as director. Carl Bryant, Johns-Manville Sales Corporation, New York, was elected a director.

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Using Shop-Drilled Stock Rails

Where turnouts have been standardized, is it practicable to store at storehouses stock rails already bent and drilled? Explain. Would the location of use—main track or yards—affect the practicability?

Include Shop-Milling

By J. W. DIFFENDERFER
Supervisor Track, Pennsylvania, Buffalo, N. Y.

One of the particular advantages of standardized turnouts is the fact that uniformly designed materials can be procured and used under similar situations throughout an entire railroad system. Along with switch points, frogs, and various switch plates, stock rails should be no exception to this standardization. Not only is it practicable under these circumstances to store stock rails already drilled and bent as required, but it is most desirable. The storing should not be limited to storehouses alone, but should be expanded to include all division points, if not sub-division headquarters under the jurisdiction of various supervisors. Stock rails, in the light of standardized turnouts, are as much a part of the required emergency stock in a particular territory as are such items as switch points, frogs, guard rails, etc.

It is desirable that stock rails be held in reserve to protect every rail section and length in use in the main-track territory, at least. Insofar as storehouses are concerned, these should also include bent and curved stock rails as well as straight ones, and all should be milled at the shop to recess the point. This is not always necessary in the field since, in an emergency, a straight stock rail can be bent readily for use on the turnout side.

A standardized turnout design serves to eliminate waste of material and to keep costly field work at a minimum; at the same time it takes advantage of the mass buying gained by such a move. Field drilling of bolt holes, milling of the rail head, and bending and curving of the stock rail are much more costly than when this work is done on a mass-production basis.

The points of potential use of the stock rails thus held on hand—whether for main tracks or yards—does not seem as important as the situation requiring their use. Even though admittedly poor practice, too often track forces must use new switch points against other-than-new stock rails. With an eye on the current budget, maintenance men are often reluctant to provide new stock rails for new points. That this is false economy soon becomes apparent. A new point under such conditions soon rolls over on the outer side, breaks badly at the point end from being higher than the stock rail, and in a short space of time is in a generally poor condition, regardless of what grinding may be attempted to keep it fit for use. Therefore, if it is necessary in an emergency or otherwise, to install a new switch point, its companion stock rail should likewise be new or *in new condition*. This practice must be followed both for main and yard switches. Local territories, as well as storehouses, should, therefore, maintain a stock of stock rails suitable to cover their needs.

Were turnouts not standardized, or where stock rails as such are not provided, it would still be necessary to provide new rails with which to make the necessary stock rails in the field. The small additional capital expenditure incurred by providing standard stock rails already drilled, milled, and bent, even though possibly held sufficiently long that the accrued interest might become a cost factor, easily offsets costly time and labor spent in making a far-from-perfect

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Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 105 W. Adams St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the December Issue

1—Is it practicable to build driveways on the right-of-way to afford access to any point by trucks, tractors or other such equipment? Explain.

2—What is the most effective way to heat camp cars? Explain.

3—How important is it to remove unnecessary or little-used crossovers or turnouts from main tracks? How many man-hours of maintenance labor can be saved annually through the elimination of each such unit. Are there other advantages to be derived? Explain.

4—Looking to the maintenance of uniform forces, what types of work can be carried out effectively by the bridge forces during the winter months? What types of work should not be undertaken in severe weather?

5—What constitutes a good snow broom? Can anything be done to prolong its service life? Explain.

6—What can be done to minimize the damage to water columns that frequently occurs while engine tanks are being filled? Explain.

7—How practicable is the use of germicidal lamps about toilet bowls and elsewhere in toilet rooms? Who should maintain such fixtures?

field-made stock rail. Hence it is highly desirable where standardized turnouts are in use, not to limit the storing of standard stock rails to the storehouses alone, but to provide each local territory with sufficient standard stock rails of each weight and length to protect properly at least all of its main-line switches in the event of an emergency.

Use Saves Labor

B. N. F. Alberts
General Track Foreman, Chicago, Milwaukee, St. Paul & Pacific, Chicago

My experience with this kind of work for a long period of years has convinced me that since turnout work has been standardized on main lines and in yards on nearly all railroads it would be to the advantage of maintenance-of-way men to have stock rails bent and drilled at the shop. Similar advantages could accrue also if closure rails required for turnouts were sawed to dimension and stored at convenient points. Furnishing stock rails from the shop already bent and drilled, together with other standard-length rails to fit turnouts, would not only help to keep turnouts in conformity with standard drawings at all times, but would help to simplify the work of replacement and cause minimum delay to train or yard-engine operation.

The location of use should not affect the practicability since turnouts have been standardized on both main lines and in yards.

This rule could not be made applicable to branch lines, intermediate yards or lines carrying light traffic as in such cases the life of a stock rail is usually about the same as the life of the other rails in track. However, for turnouts on heavy-traffic lines, and especially those involving continuous diversion of trains for use in busy ladder tracks and crossovers in yards where frequent rail changes are made, either because of wear or damage by derailment, it is quite profitable to have stock rails as well as dimensioned closure rails prepared at shops and held at convenient points where they will be available for quick replacement. To follow this plan it is necessary that the track through the turnout and vicinity be kept well anchored to hold rails, switch and frog in proper position. If this is done, no difficulty will be experienced in making replacements when necessary.

About 12 years ago a ladder track consisting of 16 No. 7 1/7 turnouts was relayed with 90-lb. material using secondhand sawed rail, the work being handled by constructing every turnout according to standard drawings. Following the installation, stock rails and closure rails were prepared and assembled at a convenient point so they could be reached quickly whenever a replacement might become necessary. Having these rails available, we have been able to make repairs with minimum delay to switching operations.

We cut these rails in the field to fit the turnouts and have since made a special effort to keep a supply of them on hand at all times. Although this method was effective it would have been much easier and more economical to have had these rails furnished from the shop.

Recently, a ladder track, consisting of 7 No. 7 1/7 turnouts has been relaid with 100-lb. sawed secondhand rail. We have prepared two stock rails —one for each side—and a rail for each closure rail that makes up the turnout. This material is being held where it can be handled conveniently from the rack at any time to make a quick replacement. A similar plan has been applied to some of our main-line turnouts constructed with 131-lb. material. These turnouts carry exceptionally heavy traffic and are subject to continual diversion movements, and the rails, switches and frogs must be changed frequently.

Uses for Prefabricated Buildings

For what specific railway uses are prefabricated buildings adapted? What are their advantages? Their limitations?

Erection is Simple

By R. C. Henderson
Master Carpenter, Baltimore & Ohio, Dayton, Ohio

Prefabricated buildings may be of wood, steel or concrete construction, each type having its own particular advantages for various roadway buildings, such as section tool houses, labor camps, telephone booths, crossing shanties and relay houses.

Prefabricated buildings are also suitable for small and medium size buildings in and around terminals, and are being used as dwelling units for workers and their families. In most cases these units are furnished by the railroad in order to get and hold a labor force. Without them labor would not be available.

The advantages gained by the use of prefabricated structures are many, the most important being the lower cost of purchase and erection. Under the existing labor and material shortages, this is a real advantage over structures erected in the conventional manner.

When properly designed, prefabricated structures are relatively easy to erect with unskilled labor, whereas the construction of conventional type buildings requires skilled mechanics. This is a very important factor with us since it is all but impossible to get and hold skilled labor.

Another advantage of properly designed prefabricated structures is that they may be dismantled and re-erected at other locations at minimum cost. This is important to all railroads where efficiency is closely followed up.

Perfabricated structures are limited as to size and certain types by the character of their use. For instance, a steel building may be used satisfactorily for oil storage but not for a section toolhouse where salt might be stored.

Prefabricated buildings should also be limited to the fewest possible number of designs, with the members or sections interchangeable. This would permit the size of the building to be increased or decreased as necessity arises.

In conclusion, I feel that the use of prefabricated buildings has not been given the consideration due it. With material and labor costs mounting higher and higher and the shortage of skilled workmen becoming more extreme, a great saving could be made if this type of building were used wherever suitable.

Salvageability An Asset

By T. J. Engle
Engineer of Buildings, Chicago, Rock Island & Pacific, Chicago

We have several buildings of this type in service at various shop and engine terminals where they are used for the following purposes: (1) Diesel locomotive servicing building; (2) sandblast building; (3) store department stock building; (4) shop reclamation building (5) mill building. We are obtaining good utility and service life from the structures now in use.

In addition to the low first cost, the principal advantage that we find in this type of building is the fact that it can be dismantled and re-erected in a new location at consider-

ably less cost than other type structures.

In regard to the limitations, we have some prefabricated steel buildings which are used for Diesel servicing shelters, and find that we get a lot of condensation or sweating on the walls and ceilings unless they are insulated. However, many steel fabricated buildings are being furnished with an insulated roof and, if it is later required, the side walls can also be insulated to eliminate this objection and provide a much warmer house.

Remote-Controlled Switch Heaters

Is it practical or feasible to provide remote control for electric or gas switch heaters? Under what conditions? How can this be done?

Service Tests Favorable

By A. L. Essman
Chief Signal Engineer, Burlington Lines, Chicago

The railroads are successfully operating track switches by remote control and are automatically retarding cars passing over humps in spite of numerous problems. By the solution of even fewer problems, electric and gas switch heaters can also be operated in a satisfactory manner by remote control.

A remote control switch heater can be applied readily in C.T.C. territory by using either the channel now provided for the maintainers' call light or the "stick or non-stick feature", or the "overstepping" device which is provided on most C.T.C. machines. To use such a heater in electric interlockings where spare channels are not provided would necessitate the use of additional line conductors. However, in this case the distance is relatively short and wire space on the pole line can usually be provided.

Last winter we had a remote-control switch heater installed which I understand was one of the first that was developed. This installation utilized the existing maintainer's call circuit to turn the heater on or off. No failure was experienced that was chargeable to the method of control, and the one failure that came to my attention was when one burner failed to light owing to a broken wire. The possibility of a recurrence of this type of failure has been eliminated by a change in the design.

It is my opinion that remote-control switch heaters will provide more reliable operation of switches than would manually-operated heaters. Should a snow storm occur at night, a considerable amount of snow will usually accumulate before the men who are called can get to outlying switches to ignite manually-operated heaters. It is more difficult to clean out this accumulated snow than it is to melt it as it falls. In the case of remote-control switch heaters the operator can turn them on as soon as the storm starts and thereby take care of a heavy snowfall. Of course, there will be times when the snowfall will be so great that it is questionable whether any type of switch heater could keep the switches clean.

I understand the question has been raised as to whether or not it is necessary to provide indicators on remote-control switch heaters to designate when they are actually burning. It has been our experience that these heaters are very reliable and I feel that indicators are not necessary. If the dispatcher is able to operate the switch, that is all he is endeavoring to accomplish, and any failure of the switch to operate would be sufficient indication that the heaters either were not lighted or were unable to keep the switch open owing to the severity of the storm.

Ventilating Diesel Repair Shops

What are the most effective methods of ventilating Diesel locomotive maintenance and heavy-repair shops? Do different areas require different treatment? Explain.

Uses Trapezoidal Ducts

By I. H. Schram
Chief Engineer, Erie, Cleveland, Ohio

Removal of exhaust fumes from Diesel service and repair shops to provide an adequate supply of fresh air is essential to good working conditions. In the design of an effective ventilating system the following factors must be considered: (1) Size of units to be serviced and tested; (2) will units be tested at idling speed, full speed, no load, or full speed, loaded? (3) location of exhaust outlets and length of units; and (4) provision for expansion to serve larger units.

The volume of fumes exhausted varies with the size of the unit. Up to the present time we have not loaded the units when testing but do frequently run them at full speed. For a 1,500 hp. unit the volume of fumes under that test condition is 7,500 cu. ft. per min. and our ventilating systems are designed on that basis.

To overcome the varying locations of exhaust outlets and different-length units as found in the locomotives of different manufacturers, we have resorted to a duct system, trapezoidal in shape, having a bottom opening of sufficient width so that the fumes can be directed into the duct regardless of the location of the exhaust outlet or position of the locomotives on the service track. This requires a duct the full length of the service track. The height of the duct above the locomotive is dependent on whether the top of locomotive must be accessible for inspection and servicing. With the bottom of the duct seven feet above the top of locomotive, we have found that a 14-ft. duct opening is adequate.

At locations at which no work is done on the tops of locomotives the duct is kept just high enough to clear radio apparatus, horn, etc. We have one such installation that is provided with movable closure plates operating on the flanges of the bottom-channel framing of the duct. These closure plates can be adjusted to close off the duct except at the exhaust openings. This is of special value during the winter months, as it is desirable in periods of cold weather to draw out as little surplus shop air as possible, since all warm air removed with the fumes must be replaced with cold air drawn into the building through louvers or windows. Air used for combustion in the engine is involved as well as any excess air drawn out by the ventilating system, hence the exhaust system should be arranged for partial operation, preferably in steps of about 1/3, ½ and full capacity for each of the units in a locomotive.

The ducts in use on this road are made of a light, structural frame covered with a corrugated, non-corrosive metal and supported from the roof trusses of the building. The fan ventilators are centrally controlled so that the operation of any one or all of the units can be regulated. We have not found it necessary to install ventilators having motor controlled dampers, but do intersperse gravity-type ventilators between the fan ventilators and find that this gives ade-

quate ventilation when only natural draft is required.

We have not installed any fume-removal equipment in the general-repair section of the shop for two reasons: (1) Engines are seldom run for any length of time in this section; and (2) the overhead crane in this section makes it difficult to install fume-removal equipment.

Builds Pockets in Roof

By B. R. Meyers
Assistant Chief Engineer, Chicago & North Western, Chicago

Diesel engine exhaust fumes are low in carbon monoxide but are irritating to the eyes and nose and must be removed from Diesel shops. In the initial stages of planning the design of two Diesel shops now under construction on this system, we approached the fume-removal problem with the idea of installing close-fitting hoods over the exhaust ports on the servicing tracks similar in design to smoke jacks commonly in use in steam enginehouses. However, in investigating this problem we found that there was considerable variation in the location of the multiple exhaust ports on the various sizes and makes of Diesel locomotives. This would either require an almost continuous hood or the limiting of the use of the track to certain locations. Furthermore, such hoods would have to be provided with a vertical adjustment to fit all types and makes properly. The use of hoods would also interfere with the use of overhead traveling cranes unless the hoods could be raised or swung up to clear.

Owing to these complications, the plan for constructing close-fitting hoods was abandoned and a design adopted whereby pockets were constructed in the roof structure. The roof trusses are about 25 ft. apart and are utilized as divisions between the pockets by the application of a Transite panel to each truss. Each pocket is two tracks wide and is equipped with a 10,000 c.f.m. power-operated roof ventilator individually controlled by a push button conveniently located on the high level platform. This roof ventilator will only be operated when a running engine is spotted under that particular pocket.

In the heavy repair portions of the shops where the roof is high and very little engine operation takes place, it was decided pockets would be unnecessary and exhaust fumes could be handled by large-volume, gravity-type roof ventilators, each having a capacity of 12,000 c.f.m. To prevent excessive loss of heat in cold weather, these gravity ventilators are equipped with motor-operated dampers and will be opened only as needed.

Although we have not yet placed the new Diesel shops in operation we expect that the method for getting rid of Diesel exhaust fumes described above will work satisfactorily.

Uses Two General Types

By K. E. Hornung
Architect, Chicago, Milwaukee, St. Paul & Pacific, Chicago

We have found that it is the servicing or maintenance areas of our Diesel facilities which require the greater consideration as to proper ventilation. Because of the nature of the operations in these areas, involving the running tests of engines, etc., the exhaust gases must be removed and the combustion air consumed by the engines replaced.

An effective method of ventilating Diesel exhaust gases in shops where the servicing is confined to one make and model of locomotive is by means of telescopic stacks, each designed to fit over an exhaust port on a locomotive. These exhaust stacks are installed on centers equal to those of the exhaust ports of the locomotive to be serviced. The locomotive is spotted accurately, and the telescopic stacks are then lowered to fit tightly over the exhaust ports. Since no mechanical exhausting device is provided, the effectiveness of this system depends entirely upon the discharge pressure of the exhaust to clear the stack.

At terminals where different types and makes of locomotives are serviced, the telescopic exhaust stack is not practical, owing to the fact that it is necessary to provide so many units. At these larger points, mechanical ventilation systems must be installed which provide sufficient changes of air to keep the noxious gases below established limits, as well as furnish satisfactorily a sufficient supply of fresh heated air.

Areas confined to heavy repairs, which I interpret as major overhaul work, usually do not require more than normal heating and ventilating systems as provided by good designing practices and code requirements for other shop facilities.

Using Loud-Speakers at Wrecks

Can loud-speakers be used effectively at train accidents or other emergencies? If so, how should they be used and for what specific purposes? Explain.

Make Speaker Use Specific

By J. F. Piper
Division Engineer, Pennsylvania, Williamsport, Pa.

Loud-speakers can be used effectively at train accidents and other emergencies if their use is confined to specific purposes and they are not abused. The misuse of a speaker system by carrying on a diatribe would only add to the confusion that exists naturally at an emergency.

There are four specific purposes for which a speaker can be used: (1) Assigned to one man stationed at an emergency telephone—to be used in paging various individuals, many of whom may be unknown to the telephone attendant; (2) assigned to an emergency operator, or other person responsible for the movement of trains—to be used to give permission to wreck masters to foul adjacent tracks or to clear them when it is desired to operate trains, and for other associated purposes; (3) to be used by the trainmaster or wreck master in charge, when more than one wreck derrick is used to handle a single piece of equipment; and (4) to be used by a watchman in multiple-track territory to clear personnel from tracks in service when a train approaches.

The most desirable speaker for emergency use is the self-contained type, which has the power source, microphone and speaker in one unit, and which can be moved at the will of the person using it.

Loud-Speakers Desirable

By J. E. Chubb
Assistant Division Engineer, Pennsylvania, Baltimore, Md.

A loud-speaker system lends itself very well to use at train accidents not only because of the services such equipment can perform, but also because the source of power, which is usually the prime problem accompanying mobile public-address systems, is available where wreck derricks are being used.

One very useful and practical application is the installation of a loud-speaker at a place on the wreck derrick where it can be plainly heard by both the derrick operator and the men on the ground. The best location is

probably within the framework of the boom, near its base, where it can be directly facing the operator and will be protected by the steel members of the boom from damage. The loud-speaker is connected through an amplifying system to a portable microphone in the possession of the wreck master. It may be that the microphone could be hung about his neck, leaving both hands free, but a hand-held one is probably better so that it can be hung on a hook on the derrick when the wreck master has to leave the immediate vicinity.

A loud-speaker eliminates the necessity of a man on the front end of the derrick to relay orders from the wreck master. The saving of a man is probably the least of the advantages in this arrangement. In addition, the derrick operator accustoms himself to the sound of the loud-speaker and will not follow a command from someone other than the wreck master by mistake. Furthermore, he receives his orders direct and there is, therefore, less chance of confusion or mistake than by having them relayed. The greatest value of this arrangement stems from the fact that the derrick operator receives his orders direct, without any time elapsing in the conveying of the commands. Obviously, this gives the wreck master far more accurate control over the movement of the derrick. He can rely on his commands for stopping movements of the boom, line or swing, being followed nearly instantly, instead of having to anticipate a certain delay while his commands are being relayed.

Men working on the ground or on equipment being handled can be given direct orders by the wreck master without his having to shout above the often loud noises of the wrecking operation.

Men working in the vicinity of the wrecking operation can hear the wreck master's directions to the derrick operator and will be aware at all times of movements about to be made. This safety feature is particularly advantageous to those directing M. W. forces working in the vicinity of the wrecking operation. Those in charge can know, without asking questions or guessing, what is going on, or just what moves are about to be made, and can get their men in the clear when necessary.

At large emergency operations, where there are a great many men present, the loud-speaker system can be used for paging officers and others who are wanted on the telephone or otherwise have to be contacted.

Most of the above advantages, and possibly others, would be realized from such a system at nearly any kind of emergency. Unfortunately, however, portable P.A. systems require certain arrangements which make their use complicated. Particular reference is made to the power supply. This problem is probably universally solved where a wreck derrick is in operation because most derricks are already equipped with a generator for lights with an output of about 32 volts. Such a supply is especially adaptable to loud-speaking systems. If needed equipment is on hand and a source of electricity is available, the placing and operation of a loudspeaker system is not only a simple matter but is highly desirable.

Requirements of Conduit Systems

What are the requirements of an effective conduit system for insulating underground piping? Explain. How should such a system differ for pipes carrying steam, hot water or oil? Why?

New Method In Use

By L. R. Reeder
Engineer, Zonolite Company, Chicago

The important requirements of an effective conduit system for the insulation of underground piping installed on railroad properties would be about as follows: (1) It should be structurally sound; (2) it should provide permanent and effective insulation; (3) it should protect pipes and metal parts against corrosion; (4) it should be easy to design and simple to alter in the field to suit job conditions; (5) it should be easy to install, and require no special handling or machinery which would not be readily available at the site; and (6) it should be economical in first cost and easy to repair.

Most engineers prefer to install yard piping underground where it is out of the way. In the past this has produced a high percentage of failures owing to moisture existing in the ground or excessive water conditions resulting from flash storms. In addition, a bad corrosive condition due to the leaching of water through cinders is usually found on railroad properties. Because of this failure factor, it has been the general practice to over-design rather than to install a simple conduit system. Therefore, first costs have always been high.

In the past the design and installation of underground conduits has followed a more or less definite pattern. An insulating medium was usually applied around the pipe, and in underground installations, where the possibility of moisture is always great, was protected with a good encasement. Many methods have been used, such as concrete, brick or clay tile boxes, split concrete, clay tile, asbestos or cast iron pipe, wood logs, prefabricated units employing metal casings, or combinations of these materials.

Where metal casings are used, failures from external moisture are relatively small and those that do occur can be traced usually to improper handling during installation. Corrosion of the metal casing is always a possibility with this type of installation. On jobs where box type conduits are installed and provided with drainage there is a minimum of trouble.

During the early days of the war-plant construction, when swamps, marshes and generally unfit land were being used for plant sites, the failures in underground conduits hit an all-time high. These failures encouraged the deve'opment of a new type of conduit consisting of a solid pour of insulating concrete completely embedding the pipes and eliminating joints and voids which might become filled with water.

This new conduit is cast in place after the piping has been assembled and tested. It provides both a solid covering of water-repellent insulation against heat and electricity and the necessary structural conduit in one unit. The insulating concrete is composed of portland cement as a binder, vermiculite granules as the aggregate, a special admixture for integral waterproofing, and water. It produces a permanent, rotproof and fireproof insulation which will not disintegrate or deteriorate from many wettings and, therefore, is ideally suited to underground installation.

Any size, number or arrangement of pipes can be encased in one conduit. Steam pipes may be included to keep oil lines warm. Rollers and metal supports are eliminated as the solid nature of the construction insures continuous support and alignment for the piping. Free movement of pipes is secured by wrapping a paper parting medium around pipes, and expansion, if not compensated in open manholes, can be handled in special loop chambers filled with a relatively weak insulating concrete.

In the mix recommended for straight runs of conduit, a compressive strength of approximately 8 tons per sq. ft. is achieved. As this is much greater than the usual bearing characteristics of the ground, there is

little or no reason to encase the insulating concrete even under extreme conditions.

A number of railroads have tried this monolithic method of construction and in every case it has proved satisfactory. Regular standard concrete mechanical mixers are used and, in general, the mixing, placing and finishing follows good concrete practice.

Each Job Is Different

By Walter L. Bartel

Director of Public Relations, the Ric-Wil Company, Cleveland, Ohio

Each steam, hot water or oil pipe distribution job is an individual problem, and the selection of the type of pipe line material utilized will vary with the topography of the project, availability and cost of the material. However, the requirements for any effective conduit system are:

(1) It must be designed for quick, inexpensive installation with minimum traffic interruptions. Prolonged installation will incur liability through accident and other hazards, interrupt railroad traffic or snarl auto traffic in the event the system is routed through busy streets. It must avoid expensive excavating or tunneling costs, and the removal and repair of paving and sidewalks.

(2) The system must be flexible in design to avoid other utility services, street or railroad obstacles.

Conditions will dictate the type of conduit system to be selected. One of the factors to be considered is the type of soil involved—whether rock, clay, or sand. If water or a swampy soil is prevalent, a watertight conduit system is required. The presence of cinders or acid will also affect the choice of a type of conduit. Selection of a conduit system also depends on whether a temporary or a permanent system is required, and on the efficiency and maintenance of that system. Other factors in the selection of the type of conduit and the thickness of its insulation are the minimum and maximum velocity of steam, the industrial process or the heating requirements of the entire load, present and anticipated future steam loads, and the pressures and pressure drops on which the system is to operate.

It is well to point out that the initial cost of materials alone should not determine specifications. Rather, the overall installation cost, the continued high efficiency of the installation, and the cost of maintenance should govern the purchase. Excluding the impracticability of installing the pipe uninsulated, and those types in which the pipe is merely covered with a wire-tied formed insulation, types of distribution systems available can be generalized as follows: (1) Factory prefabricated or manufactured system; (2) crawl or walk tunnels; (3) field constructed systems; and (4) temporary systems.

It is a well known fact that the conduit system must be watertight, since water entering the conduit will cause wet insulation and a considerable possibility of damage to the entire steam distribution system. It is, therefore, recommended that where known water conditions exist and soil drainage is poor, that a completely welded system be used.

Protecting Bridges from Brine

What are effective means of protecting the flanges of the stringers and floorbeams of open-deck steel bridges from corrosion due to brine drippings? Explain.

Good Protection is Costly

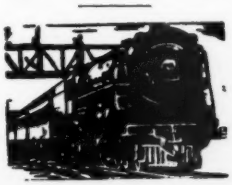
By A. E. Bechtelheimer

Bridge Engineer (Retired), Chicago & North Western, Chicago

The intensity of corrosion, which usually is proportional to the quantity of brine drippings striking the steel, is the criterion of the need for protection. The age and type of bridge span has a direct bearing on the problem because cost of protection must be weighed against the cost of periodic repairs and renewals. Those familiar with the effects of brine corrosion, no doubt, will agree that effective protection is costly. Therefore, protective measures should be confined to spans of relatively high rating capacity, especially to those spans where the cost of repairs or renewals would be unusually difficult and expensive.

For the floor members of new spans or for the replacement of such members in existing spans the use of special steels, the application of metalized coatings on carbon steels before erection, and the use of floor members of increased cross sectional area, should be considered. Adequate long-time, fully-effective protection can be secured only by the use of ballasted decks having drip-tight floors, quick drainage of free water and extra deep ballast sections.

Many expedients are used that are quite effective for a limited time, including paint coatings having metallic bases, such as graphite, aluminum, lead and cadmium, or special petroleum compounds of thick and sticky consistency with interlayers of fabric or felt to keep the material in position. Application of these coatings must be made at frequent intervals to keep them fully effective. Another expedient consists of the placing of strips of 8-oz. canvas under the ties. These strips are soaked in red lead paint for a day or two and allowed to dry before placing. The strips are wider than the stringer flanges and are turned down along each edge to shed water.



Keep Bridges Painted

By G. L. Staley

Bridge Engineer, Missouri-Kansas-Texas, St. Louis, Mo.

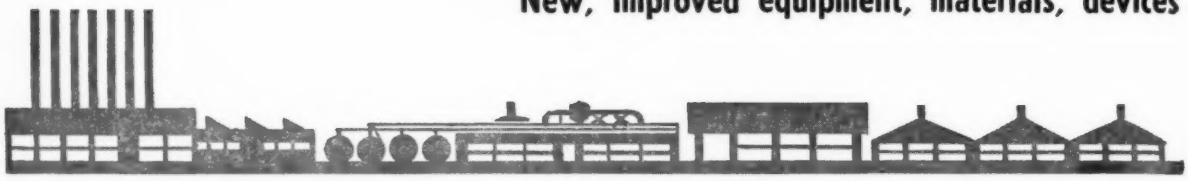
The most effective practicable means of protecting the flanges of stringers, floorbeams and other members below the track, of open-deck steel bridges from corrosion due to brine drippings is to keep them painted.

It has been reasonably well established that the rust-preventive petrolatum preparations afford the most effective protection. This type of protective material is more fool proof in that the metal need not be as free of dirt, rust, grease and small rubbish as is necessary with other types of bridge paint. Black or aluminum colors can be had, thus taking care of the decorative requirements. The use of rust-resisting, low-alloy steel may prove effective and, in many locations, economical when this material becomes readily available. The practice of increasing the thickness of the material most severely attacked by corrosion is also advocated. Zinc coating by a metalizing process has been proposed, but has not been generally done because of its cost and other practical considerations.

Future conditions may change the picture, but up to now it has been cheaper to paint and repair steel bridges than to use special metal or to plate the structural steel being supplied currently.

PRODUCTS OF MANUFACTURERS

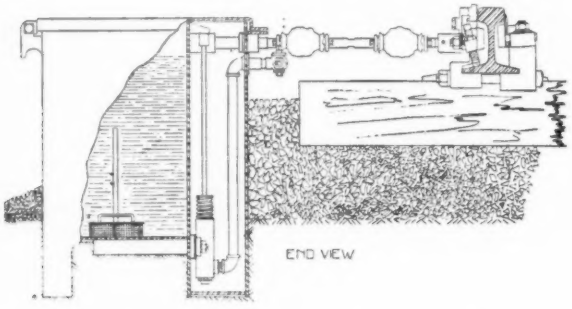
New, improved equipment, materials, devices



(For additional information on any of the products described in these columns, use postcards, page 1073)

Improved Meco Rail Lubricator

THE Maintenance Equipment Company, Chicago, has announced a new model, designated as Type MBJ, of its Meco rail and flange lubricator.

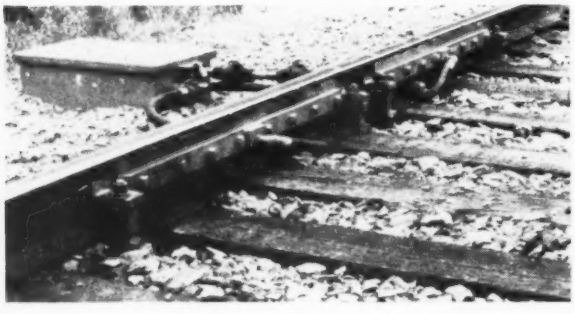


Drawing of the new Meco lubricator with cut-away view showing the closed-top screen surrounding the outlet of the grease container

The new unit, while operating on the same general principles as previous models, incorporates a number of improvements designed to increase service life and reduce maintenance costs.

In the new unit, as in previous models, a wheel-tread-operated ramp, transmitting the action through a lever shaft, actuates a pumping mechanism in the lubricant container, forcing grease through hoses to two wiping bars at the gage face of the rail head. The grease emerges in equal volumes from eight discharge ducts at the top of each wiping bar, impinging at 16 points on the throat of the flange of each wheel that passes over the wiping bars. The wheel flanges in turn distribute the grease to the gage face of the rail head wherever there is wheel-flange contact.

The gage-side assemblies of the new model are fastened to the rail by rolled-steel clamps to suit the rail sections to which the lubricator is applied. The lubricant wiping bars may be adjusted as desired on the gage face of the rail to deliver the grease at the proper height. All lubricant passages are machined to effect a more uniform flow of grease through them. The ramp-lever shaft is supported between two bearings instead of on a single bearing as in previous models. The pump lever shaft of the new model is also supported by both inboard and outboard bearings. All contacting steel parts of the new actuating mechanism subject to wear are heat treated.



Installation view of the new Meco lubricator. The lubricant wiping bars may be adjusted as desired on the gage face of the rail to deliver the grease at the proper height

To service the new lubricator, it is unnecessary either to remove the tank from the ground or to remove grease from the tank. The puddling stick and tools are stored in a compartment in the pump chamber. If it is necessary to service the pump, it can readily be lifted from the pump chamber by removing the pump push rod, loosening two nuts at the pump, and disconnecting the nipple at the top of the discharge pipe.

The cylindrical screen surrounding the outlet of the lubricant container is made with a solid top to insure that the grease is sucked through the screen into the pumping mechanism only at the sides of the screen. As a result the top surface of the grease in the tank remains approximately level as it is lowered by pumping, instead of coning downwardly. It is said that this feature lengthens the period of time between chargings of grease. The MBJ Meco lubricator can be installed on rails of sections other than that to which it was originally applied by changing, at slight cost, a few parts.

New Welding Rods

THE American Manganese Steel Division, American Brake Shoe Company, New York, has announced two new tungsten carbide welding rods for reclamation and hardfacing applications. One of these, known as Tube Tungsite, consists of tungsten carbide particles, ranging in screen size from No. 5 to No. 40, encased in a steel tube. The other new welding rod, known as Tungrod, contains tungsten particles smaller in screen size, No. 40 and finer. Both new rods are available in two types—bare for the oxyacetyline process and coated for electric welding.

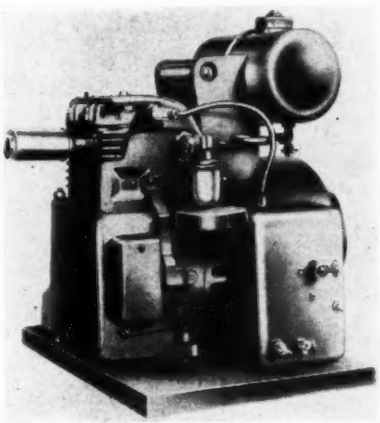
When the new rods are used in welding, the steel tube melts, forming a molten matrix in which the tungsten carbide particles remain in suspension without change. Upon solidification the weld deposit, containing 50 to 60

per cent of evenly-distributed particles of hard tungsten carbide, forms a surface said to be highly resistant to wear.

Tube Tungsite is recommended by the company for hardfacing rotary drill bits, power shovel teeth, ditcher teeth, scarifier teeth, scraper blades, and other applications where severe abrasion occurs and where efficient cutting qualities are needed. Coated Tungrod applied by the electric arc process is recommended for similar applications. For thin base metals such as hand shovels and knives of various kinds, bare Tungrod applied by the oxyacetylene process is recommended.

Lightweight Power Plant

D. W. ONAN & Sons, Inc., Minneapolis, Minn., has developed a new series of portable electric power plants, the units of which weigh only



The new Onan lightweight power plants weigh only 77 lb. and occupy less than 2 cu. ft. of space

77 lb. and occupy less than two cubic feet of space. The new series, designated as AAE models, includes 115-volt alternating-current units, with capacities of 350 watts, and 6, 12 and 32-volt direct-current battery chargers, with capacities of 300 and 400 watts. All models are powered by four-cycle, air-cooled Onan engines and all have electric push-switch starters.

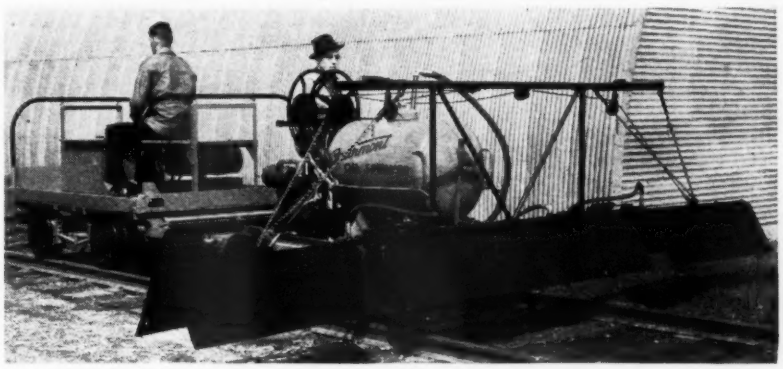
The alternating-current unit (Model 03AAE), while intended primarily for use in supplying power for 115-volt appliances, contains an unusual feature which permits connecting the plant to any automobile battery for starting and charging. This feature consists of a special 6-volt winding in the generator. Accessories for all models include the following: Carrying handle, mounted two-quart fuel tank, muffler assembly, emergency starting rope, instruction manual and plywood mounting board.

Improved Oil Sprayer

AN improved oil sprayer, incorporating a number of new features designed to increase the usefulness of the unit, has been announced by Fairmont Railway Motors, Inc., Fairmont, Minn. The new model, designated as the W61 Series B, has been designed to handle water-base liquids in addition to oil. As a result, it can be used for applying free-flowing liquid weed killers to the roadbed as well as for the pressure spraying of angle bars and other track accessories with heated oil.

Essentially, the unit consists of a 70-gal. tank with gasoline-engine-driven pump, all carried on a steel trailer mounted on four flanged wheels. The material in the tank may be heated, if desired, by an exhaust-type heater. The pump is of the rotary gear type with a capacity of 10 gal. per min. at 225 lb. pressure, while the engine is of the Wisconsin type with a rating of 2.7 hp. at an engine speed of 2200 r.p.m. The trailer, equipped with a draw-bar at each end, is towed by a section motor car.

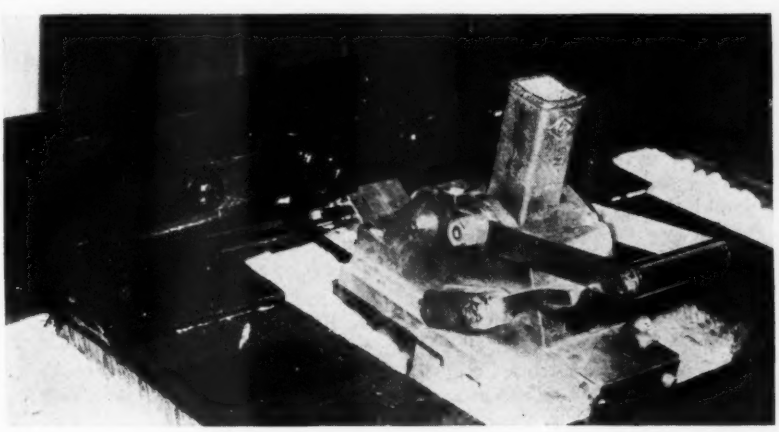
Each unit is equipped with two 15-ft. lengths of hose, each terminating in a valve-controlled spray nozzle. Two types of atomizing spray nozzles are furnished as standard equipment—a flat type and a full cone type. Using the nozzles for hand application of heated oil, it is reported that three men can spray the joint bars in one mile of track in one hour. The weed-spraying attachment, which is available as extra equipment, consists of 11 hooded nozzles.



The Fairmont W61 Series B oil sprayer with weed-sprayer attachment

Track Lining Tool

THE development of a new track lining tool which, it is said, will shift track without causing it to "hump", has been announced by the Reade Manufacturing Company, Jersey City, N. J. This tool embodies a rack-and-pawl mechanism contained within a cast steel housing. A curved



The Reade track aliner

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anchor plate is welded to the under side of the housing to engage the track ballast and provide a support for the tool when in use.

The liner is 14 in. long, overall, and 5 in. wide. The rack is arranged to provide a maximum throw of 8½ in. and is operated by means of a standard lining bar inserted in a socket provided in the operating lever. The toe of the rack is designed so that it may be applied to the base of the rail, or at joints, frogs or switches. The thrust imparted to the track is 20 times greater than the force applied to the lining bar.

The design of the curved anchor plate and its location with respect to the toe of the rack are said to insure horizontal motion of the rack, and with it, the track being lined, with minimum tendency toward raising or humping the track. As an added precaution against this, the hold pawl of the tool is counterbalanced in such a manner that the rack is tripped whenever the toe is raised as much as one inch during lining operations.

The small size of the tool facilitates its use between the ties. Further, it is stated that the liner will clear the running gear of rolling stock if the lining bar is removed from its socket. The tool weighs 27 lb. and is carried by a convenient handle.

The Model P-43 power track drill in operation

Power Track Drill

THE Railway Track-work Company, Philadelphia, Pa., has announced a new model track drill, designated as No. P-43. This model incorporates a number of improvements designed to speed drilling operations and thereby reduce costs.

Power for driving the drill is supplied by a 1½-hp. air-cooled gasoline engine through an adjustable V-belt and gear-reduction unit. The V-belt acts as an overload release in case the drill bit becomes stalled during drilling operations. The engine and drill assembly are mounted on a frame which is supported at one end by a bracket that fits over the track rail and at the other end by two supporting screw columns. The rail head bracket is provided with a screw, resting on the top of the rail head, for adjusting the drill to the desired height for drilling. Further leveling of the drill is accomplished by adjustments at the supporting screw columns. The drill bit is fed by a screw and, it is said, can drill a hole in approximately one minute.

The rail-head bracket is provided with a telescopic extension to accommodate drilling at heels of switches. The chuck jaws are designed for flat beaded bits ranging in size up to 1½ in. When the chuck is loosened for changing bits, the jaws remain open automatically. This unit is 24 in. high, 22 in. wide, 36 in. long and weighs 125 lb.

Rail Drill Grinder

THE Hisey-Wolf Machine Company, Cincinnati, Ohio, has announced a new grinder especially designed for sharpening flat beaded rail drills. It consists of a pedestal-mounted one-horsepower motor with two 1½-in. by 10-in. cup grinding wheels, one at each end of the motor shaft. The height of the motor shaft above the floor is 38 in. and the distance between the grinding wheels is 18½ in.

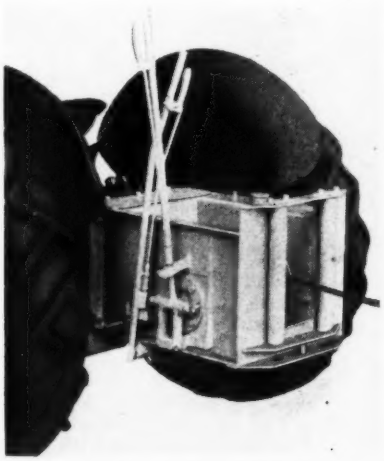
The wheel on the left side of the machine is used for grinding the points of drill bits, both flat and twist types, while the one on the right is used for thinning the webs of flat drill bits. Each side of the machine is equipped with an attachment for holding the bit in the proper position while grinding. The Hisey drill grinder will sharpen flat beaded rail drills ranging in size from ½ in. to 2 in. and ordinary twist drills up to 2½ in. in diameter. Standard equipment includes the two grinding wheels, two diamond wheel dressers, and a manual motor starter. A magneto starter is available at extra cost.

The new Hisey grinder for sharpening flat beaded rail drills

Winch Attachment for Wheel-Type Tractors

THE American Hoist & Derrick Co., St. Paul, Minn., has announced a new winch attachment, called the American Tractowinch, for application to industrial wheel-type tractors. It is a single-drum unit with a maximum capacity of 7,500 lb. (single-line pull on the first layer of cable). It is said to be easily installed for winch work or quickly removed if the power take-off of the tractor is required for other attachments.

The special features of the new



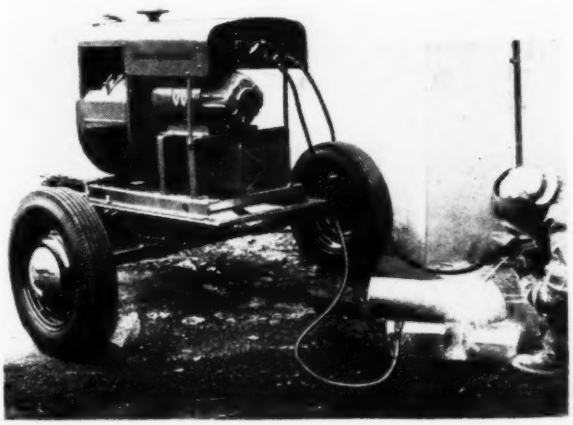
The American Tractowinch installed on a tractor

(For additional information on any of the products described on this page, use postcards, page 1073)

tractor winch include fairlead rollers which allow a sharp offlead of the cable to either side, a hand-operated contracting-band brake, and a drawbar built into the winch frame which permits the tractor to perform towing jobs without first removing the winch.

Lightweight Welder

THE General Electric Company, Welding Equipment Division, Schenectady, N.Y., has announced a new lightweight, engine-driven, direct-current welder which is said to have a wide variety of applications. The welder weighs 660 lb. and, it is said, can be transported easily in the body of a pick-up truck. If desired, the unit can be furnished mounted on a two-wheel pneumatic-tired trailer.



Left—Fabricating a piece of pipe with the new General Electric welder mounted on a trailer

The unit consists of a G-E Type WD-3200 generator, V-belt-driven by a Wisconsin VF-4 air-cooled engine. It is equipped with a calibrated dual control which permits the accurate setting of a desired welding current before the arc is struck. The welder has a built-in auxiliary 110-volt power outlet for the operation of lights and power tools. The dimensions of the unit are 44⅛ in. in length, 24½ in. in width and 35⅜ in. in height. Its maximum welding current is 250 amp.

Electric Hand Lamp

A portable electric hand lamp with a built-in battery charger which can be plugged into any 110-volt alternating-current circuit, has been announced by the U-C Lite Manufacturing Company, Chicago. It is known as the Big Beam Model No. 312. Other features of the lamp include a spill-proof battery with an acid-proof plastic case which is said not to leak regardless of

The new Big Beam lamp, Model No. 312

the position in which the lamp is held, and a three-ball charge indicator incorporated in the battery itself, which eliminates the need of hydrometer tests to determine the condition of the battery. With proper attention the battery is said to have a service life ranging from three to five years.

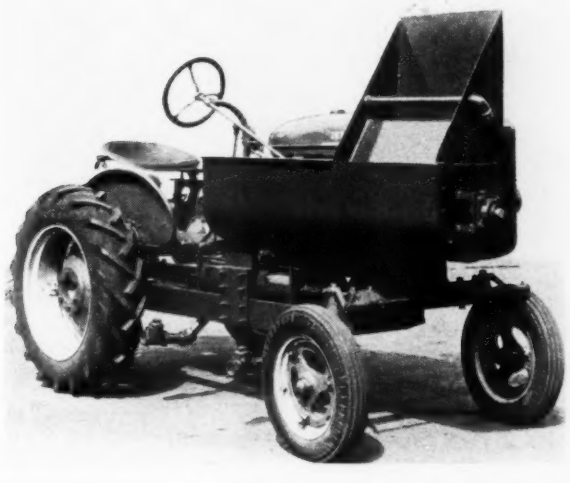
The battery and charger are contained in an 18-gage welded-steel case with an acid-proof baked-enamel finish. The container is provided with a window through which the charge indicator can be seen at all times. The carrying handle is chromium plated and is equipped with rings for a shoulder carrying strap.

The lamp head, of chromium-plated, 25-gage steel, is 6 in. in diameter and has a triple-silvered reflector. It contains a main bulb for a beam light and a small auxiliary bulb for dim diffused light. Both bulbs are controlled by a single-pole, double-throw toggle-type switch. The head can be swiveled in a vertical plane through a range of 170 deg. A number of accessories are available for the lamp, including colored and diffusing lenses, shoulder carrying strap, and hold-down and swivel brackets.

Grouting Unit

W. F. HEBARD & Co., Chicago, has developed a new self-contained unit, called the Offtrack Grouter, for injecting grout into roadbeds. It consists of equipment for pumping water from storage tanks, mixing the grout and forcing the mixture through injection points, all mounted on a wheel-type tractor. The entire unit is said to be completely mobile over any terrain.

The grout pump is a double-acting, hydraulically-operated unit having a capacity of 220 cu. ft. per hr. at a pressure of 400 p.s.i. and a stroke of 13½ in. The length of the stroke is said to be easily adjusted for smaller capacities if desired. The grout pump, together with a small air compressor and the water pump, operate from a power take-off on the tractor's 4-cylinder, 24-hp. engine. The principal purpose of the air compressor is to clean the grout hoses by blowing them out. The hydraulic system contains a safety valve which is claimed to prevent damage to equipment or grout lines. All parts of the unit are said to be readily accessible for maintenance. The Offtrack Grouter is 6 ft. high, 11 ft. long, 5 ft. 3 in. wide, and has a tread gage of 4 ft. 5 in.



Right—The Hebard offtrack grouter

(For additional information on any of the products described on this page, use postcards, page 1073)

THE MONTH'S NEWS

Happenings among the railways—the associations—the suppliers

Changes in Railway Personnel

General

C. H. Lineberger, assistant superintendent of the Carolina division of the Seaboard Air Line at Charleston, S.C., and a former division engineer, has been promoted to division superintendent, with headquarters at Tampa, Fla.

Engineering

B. R. Meyers, whose promotion to assistant chief engineer of the Chicago & North Western, with headquarters at Chicago, was reported in the August issue, was born at Ames, Iowa, on April 3, 1903, and received his higher education at Iowa State College. He entered railroad service in 1918 as a bridge and building carpenter on the North Western and served in that capacity during school vacations

B. R. Meyers

until 1925, when he became a draftsman on the Chicago, Rock Island & Pacific at Chicago. From 1926 to 1928 he served as rodman and instrumentman on the Rock Island lines in Oklahoma and Kansas. On April 15, 1929, he returned to the North Western as an instrumentman at Boone, Iowa, and was promoted to assistant general bridge inspector at Chicago in January, 1930. Mr. Meyers was assistant engineer at Sioux City, Iowa, from January 1, 1937, to October 1, 1939, when he was appointed trainmaster. He was advanced to office engineer at Chicago on April 1, 1945, and to assistant to chief engineer in March, 1946. Mr. Meyers was serving in the latter position at the time of his recent appointment.

Effective October 1, **F. R. Layng** retired as vice-president and chief engineer of the Bessemer & Lake Erie to become consulting engineer of the road, with headquarters as before at Greenville, Pa. **L. E. Yewell,** assistant to chief engineer at Greenville, succeeds Mr. Layng as chief

F. R. Layng

engineer, and **L. D. Shelkey,** supervisor of track, has been appointed office assistant to chief engineer.

Mr. Layng was born at Salem, Ohio, on September 9, 1878, and received his higher education at the Western University of Pennsylvania. He entered railroad service in 1897 as a rodman on the Pennsylvania, and in 1900 he went with the B. & L.E. as draftsman. Two years later he became assistant engineer, being advanced to engineer of bridges and buildings in 1903, and to engineer of track in 1906. Mr. Layng retained this position until the latter part of 1926, when he was promoted to assistant chief engineer. In 1931 he was advanced to chief engineer, and in 1946 he was appointed vice-president and chief engineer.

Mr. Yewell was born on June 23, 1892, at Baltimore, Md., and attended Baltimore Polytechnic and Cornell university, being graduated from the latter college in 1912 with a Bachelor of Science degree in civil engineering. He entered railroad service in August, 1912, as an axeman on the Baltimore & Ohio, and in January of the following year he went with the B. & L.E. as draftsman. He subsequently advanced through the positions of chief

L. E. Yewell

draftsman and supervisor of track, and in June, 1939, he was appointed engineer of bridges and buildings. In August, 1947, Mr. Yewell was promoted to assistant to chief engineer, the position he was holding at the time of his recent appointment as chief engineer.

Mr. Shelkey was born on December 3, 1911, and received the degree of Bachelor of Science in civil engineering from the University of Pittsburgh in 1933. He entered railroad service in May, 1934, as an assistant on the engineer corps of the Pennsylvania, and in April, 1936, was advanced to assistant supervisor of track. From December, 1940, to May, 1941, Mr. Shelkey served as transitman with the Carnegie-Illinois Steel Corporation, and on the latter date he went with the Bessemer & Lake Erie as assistant supervisor of track. In February, 1943, he was advanced to supervisor of track at Greenville, which position he held until his appointment as office assistant to chief engineer.

M. A. Hanson has been appointed engineer of research of the Gulf, Mobile & Ohio, at Bloomington, Ill.

R. F. Garner, assistant track supervisor on the Boston & Maine, with headquarters at Dover, N.H., has been promoted to assistant engineer on the Portland division, replacing **Samuel H. Scribner,** who has retired.

(*Please turn to page* 1062)

Railway Personnel (Cont'd)

H. G. Dimond, chief draftsman of the Great Northern at St. Paul, Minn., has been promoted to office engineer, succeeding **A. McChesney,** who has retired.

J. R. Murray, roadmaster on the Denver & Rio Grande Western, with headquarters at Green River, Utah, has been promoted to division engineer at Grand Junction, Colo., to succeed **W. B. Jacobsen,** transferred.

C. W. Milton, division engineer on the Canadian National, with headquarters at Campbellton, N.B., has been appointed division engineer and bridge and building master with headquarters at Charlottetown, P.E.I.

J. E. Barron, junior engineer of the Southern, with headquarters at Cincinnati, Ohio, has been promoted to assistant engineer, with the same headquarters.

J. A. Jorlett, master carpenter on the Conemaugh division of the Pennsylvania, has been promoted to assistant engineer, office of the chief engineer, New York zone, with headquarters at New York.

A. L. Becker, architect of the Missouri Pacific Lines at St. Louis, Mo., has been appointed engineer of structures at that point, without change in duties. The position of architect has been abolished. **J. H. Shieber** has been appointed assistant engineer of structures at St. Louis, the post of assistant architect being abolished.

Cecil F. Anderson, draftsman in the Louisville (Ky.) office of the Louisville & Nashville, has been appointed assistant engineer on the road's Birmingham division, with headquarters at Birmingham, Ala. He succeeds **A. E. Hotard,** who has been transferred to Louisville as assistant engineer in the bridge department. **Marow W. Cox,** assistant engineer at Louisville, has been appointed resident engineer at DeCoursey, Ky., to supervise yard improvements at that point.

L. V. Johnson, maintenance engineer of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Minneapolis, Minn., has been appointed district engineer, Stevens Point division, with headquarters remaining at Minneapolis. He succeeds the late **Ward J. Cable.** Mr. Johnson is replaced by **A. D. Alderson. J. P. Gannon** has been appointed division engineer, Stevens Point division, with headquarters at Stevens Point, Wis.

Malcolm Young, whose appointment as division engineer on the Pennsylvania, with headquarters at Erie, Pa., was noted in the August issue, was born at Portland, Ore., on September 11, 1911, and was graduated from Yale university in 1934. Mr. Young entered railroad service in 1934 with the Long Island and the following year was appointed assistant on the engineer corps. He was advanced to assistant supervisor in 1936, and to supervisor in 1940. In 1947 he was promoted to assistant division engineer at Baltimore, Md., which position he held until his recent appointment as division engineer at Erie, Pa.

William C. Gretzinger, whose appointment as division engineer on the Pennsylvania, with headquarters at Grand Rapids, Mich., was noted in the August issue, was born on March 7, 1905, at Lewisburg, Pa., and was graduated from Bucknell university in 1927. He entered the service of the Pennsylvania on June

William C. Gretzinger

13, 1927, as an assistant on the engineer corps, and in July, 1928, was advanced to assistant supervisor of track. From February 1, 1934, to September 16, 1945, Mr. Gretzinger served as supervisor of track, and on the latter date he was appointed assistant division engineer on the Philadelphia Terminal division, the position he was holding at the time of his recent promotion.

J. W. Neikirk, whose promotion to manager of roadway maintenance of the Norfolk & Western, with headquarters at Roanoke, Va., was announced in the August issue, entered the service of this road as a section man on the Radford division in October, 1918. He rose successively to relief section foreman, assistant

J. W. Neikirk

extra gang foreman and section foreman prior to his promotion to assistant roadmaster at Pulaski, Va., in November, 1936. He was promoted to roadmaster, Radford district, in March, 1938, and to assistant superintendent, Scioto division, at Portsmouth, Ohio, on April 1, 1939, the position he held at the time of his recent promotion.

J. C. Aker, assistant chief engineer of the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., has been advanced to chief engineer at that point, succeeding the late **R. L. Schmid,** whose death is reported elsewhere in these columns. **R. W. Mabe,** bridge engineer, succeeds Mr. Aker, and **S. H. Hailey,** engineer of fuel and water service, has been appointed senior assistant engineer.

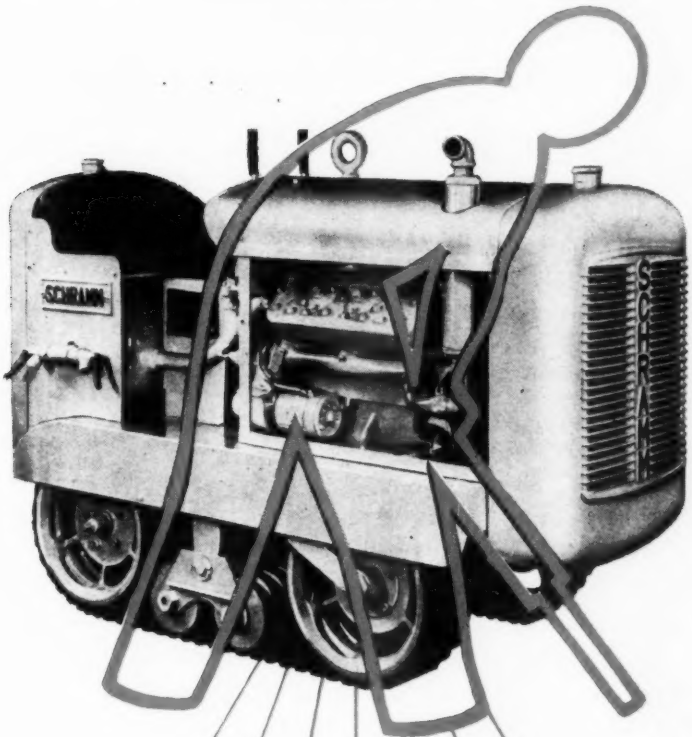
Belsur Bristow, whose appointment as engineer maintenance of way of the Chicago, Rock Island & Pacific, with headquarters at Chicago, was reported in the September issue, was born at Frankford, Ind., on May 22, 1900. He was graduated by Oklahoma University with a civil engineering degree, and entered the service of the Rock Island in 1922. Mr. Bristow subsequently held positions as chainman, rodman, masonry inspector, instrumentman, assistant engineer, track supervisor and roadmaster. He was appointed roadmaster at Fort Worth, Tex., in 1941, and went to Houston, Tex., in the following year as engineer and roadmaster. In 1946 he was appointed division engineer at Houston, where he was located at the time of his recent advancement.

Ben H. Goodwin, whose appointment as division engineer of the Southern, with headquarters at Valdosta, Ga., was reported in the July issue, was born at Elizabeth City, N. C., on November 5, 1906, and was graduated from the University of North Carolina in 1927 with a degree of Bachelor of Science in civil engineering. He entered the service of the Southern in August, 1927, as a rodman at Danville, Va., and in October, 1927, he became a student apprentice on the Atlanta division. In February, 1930, Mr. Goodwin was advanced to assistant track supervisor, and in September, 1935, he was further promoted to track supervisor at Cochran, Ga. He was appointed bridge and building supervisor at Atlanta, Ga., in October, 1937, and in April, 1946, he was appointed assistant division engineer at that point. He was holding the latter position at the time of his recent promotion.

Russell B. Fetters, whose promotion to division engineer of the Southern division of the Chicago, Rock Island & Pacific at Ft. Worth, Tex., was reported in the August issue, was born on September 9, 1899, at Wellington, Kan. He entered railroad service in June, 1917, as a clerk in the maintenance of way department of the Atchison, Topeka & Santa Fe, and in March, 1920, he went with the Rock Island as a chainman at Herington, Kan. He subsequently served in various capacities in the engineering department until July, 1926, when he was appointed assistant engineer on the Kansas division. He became resident engineer at Lawson, Mo., in November, 1930, and in June, 1932, he was advanced to track supervisor at Topeka, Kan. In January, 1942, he was further promoted to roadmaster at McAlester, Okla., in which capacity he subsequently served at Little Rock, Ark., and Goodland, Kan. He was stationed at the latter point at the time of his recent appointment as division engineer.

(*Please turn to page* 1064)

SCHRAMM MODEL 60 CRAWLER AIR COMPRESSOR



It goes where the work is

In railroad maintenance, the swing is to off-track compressors in small capacity units. Flexibility is the big reason, for they make it easy to tailor the equipment for the job at hand, whether it be out-of-face or spot tamping. And trackmen say that the Schramm Model 60 is the handiest compressor that ever climbed a fill. Riding on its crawler treads, it goes merrily along, even to places difficult to reach. The result is that you will find lots of uses for it, even when there is no ballast that needs tamping.

We want to tell you more about the Schramm Model 60 Crawler—its unique power plant, its compactness, and its adaptability to other jobs besides supplying compressed air. Get your copy of bulletin FC 48 from the Railway Sales Division, Schramm, Inc., "The Compressor People," West Chester, Pennsylvania.

Perfect for every air use

Railway Personnel (Cont'd)

J. L. Perrier, office engineer in the chief engineer's office of the Chicago & North Western, with headquarters at Chicago, has been promoted to principal assistant engineer in the chief engineer's office, with the same headquarters, succeeding **M. S. Reid,** who has been appointed division engineer of the Western division of the Chicago, St. Paul, Minneapolis & Omaha (part of the North Western System), with headquarters at St. Paul, Minn. Mr. Perrier is succeeded by **L. J. Deno,** assistant general bridge inspector at Chicago. **J. P. Datesman,** division engineer on the North Western at Chicago, has been promoted to the newly-created position of engineer of track, with the same headquarters. **C. J. Freseman,** assistant engineer on the Eastern division of the C.St.P.M.&O. at St. Paul, has been promoted to division engineer at that point, succeeding **C. E. Hise,** who has been transferred to the North Western at Chicago to succeed Mr. Datesman. **G. A. Linn,** supervisor of bridges and buildings on the North Western, with headquarters at Boone, Iowa, has been appointed division engineer of the Black Hills division.

Robert J. Bruce, whose promotion to assistant division engineer on the Missouri Pacific, with headquarters at Kansas City, Mo., was reported in the July issue, was born at St. Louis, Mo., on February 14, 1906, and attended the Universities of Washington and Arkansas. He entered the service of the Missouri Pacific in July, 1922, as a chainman at St. Louis, subsequently serving as rodman and instrumentman until February, 1929, when he was appointed assistant to division engineer on the Missouri-Illinois, with headquarters at Bonne Terre, Mo. In May, 1932, Mr. Bruce became assistant extra gang foreman and instrumentman on the Illinois division of the Missouri Pacific, and from November, 1935, to June, 1943, he served successively as fuel inspector, traveling car agent and instrumentman. During 1943 and 1944, Mr. Bruce was maintenance engineer with the U. S. Railway Mission in Mexico and maintenance officer with the U. S. Railway Mission in Colombia. In November, 1944, he was appointed roadmaster on the Missouri-Illinois at Bonne Terre, and in May, 1947, he was advanced to assistant engineer on the Missouri Pacific, which position he was holding at the time of his recent promotion.

W. J. Savage, whose appointment as assistant chief engineer of the Texas & Pacific at Dallas, Tex., was noted in the September issue, was born on July 15, 1908, at Warren, Ark. He graduated from Rice Institute, Houston, Tex., in 1928 with a degree in civil engineering, and shortly thereafter entered the bridge department of the Missouri-Kansas-Texas at St. Louis, Mo., as a draftsman. In the following year Mr. Savage joined the Missouri Pacific as bridge inspector, and in 1932 was transferred to the system bridge gang. He worked successively as carpenter helper, apprentice ironworker, junior ironworker, assistant bridge foreman of system gang and foreman of system bridge gang. He was transferred in 1937 to the office of bridge engineer at St. Louis as draftsman and designer and in 1939 he joined the Public Works Administration as engineer special agent in the division of investigation, Omaha, Neb. Mr. Savage rejoined the M.P. as bridge inspector in 1940, and, until he entered the army in May, 1942, worked as assistant to supervisor of system bridge gangs. Following

W. J. Savage

military service in the Corps of Engineers, during which time he was advanced to lieutenant colonel, he returned to the M.P. in 1945 as assistant engineer in the office of chief engineer at St. Louis. He was subsequently placed in charge of grade and line revision work in connection with flood protection along the Mississippi river in Illinois, which duties he was performing at the time he joined the T. & P.

V. R. Walling, assistant chief engineer of the Chicago & Western Indiana and the Belt Railway of Chicago, with headquarters at Chicago, has been promoted to chief engineer, succeeding **F. E. Morrow,** who has retired after 39 years of service with the roads. **A. B. Hillman,** engineer maintenance of way, succeeds Mr. Walling as assistant chief engineer, and **V. V. Holmberg,** assistant engineer, has been promoted to engineer maintenance of way to succeed Mr. Hillman.

Track

Howard L. Hood, section foreman on the Illinois Central at Rockwell City, Iowa, has been promoted to supervisor of track, with headquarters at Cherokee, Iowa, succeeding **John P. Turnlund,** who has retired.

E. H. Waring has been appointed roadmaster on the Denver & Rio Grande Western, with headquarters at Green River, Utah, succeeding **J. R. Murray,** whose appointment as division engineer is reported elsewhere in these columns.

J. F. D. Soucy, section foreman on the Boston & Maine, at Sanbornville, N.H., has been appointed acting assistant track supervisor, with headquarters at Dover, N.H., to succeed **R. F. Garner,** whose promotion to assistant engineer is noted elsewhere in these columns.

Rubin J. Diener, whose appointment as general supervisor of track on the Chesapeake & Ohio, with headquarters at Saginaw, Mich., was reported in the July issue, was born in Tuscola county, Mich., on May 31, 1896, and entered railroad service as a section laborer on the Pere Marquette in September, 1913. He served with the armed forces during World War I, and on September 1, 1920, he was promoted to section foreman, with headquarters at Gera, Mich. On July 18, 1927, Mr. Diener was appointed supervisor of track with headquarters at Saginaw, which position he held until his recent promotion to general supervisor of track, with the same headquarters.

V. M. Schwing, assistant supervisor of track on the Bessemer & Lake Erie, with headquarters at Greenville, Pa., has been promoted to supervisor, with the same headquarters, succeeding **L. D. Shelkey,** whose appointment as office assistant to chief engineer is reported elsewhere in these columns. **James E. Foreman, Jr.,** draftsman, succeeds Mr. Schwing as assistant supervisor of track, with headquarters at Greenville, Pa.

Mr. Schwing was born on March 20, 1920, and attended Ohio State university, from which he was graduated in 1942 with a Bachelor of Science degree in civil engineering. During World War II he served as a first lieutenant, and on February 15, 1946, he entered the service of the Bessemer & Lake Erie as assistant supervisor of track, the position he was holding at the time of his recent promotion to supervisor of track.

D. H. Harris, assistant supervisor of track on the Eastern division of the Pennsylvania, at Orrville, Pa., has been promoted to supervisor of track on the Renovo division, with headquarters at Reynoldsville, Pa., succeeding **F. H. Bentley.** Mr. Bentley will continue as supervisor of track—special duty, with headquarters as before at Reynoldsville. **M. L. Hershey,** assistant supervisor of track on the Conemaugh division, at Aspinwall, Pa., has been transferred to the Eastern division, with headquarters at Orville, succeeding Mr. Harris. **D. R. Wolfe,** junior engineer on the Middle division, at Altoona, Pa., has been promoted to assistant supervisor of track, succeeding Mr. Hershey at Aspinwall.

R. D. Baldwin, assistant supervisor of track on the Eastern division of the Pennsylvania, at Canton, Ohio, has been promoted to supervisor of track on the Cleveland division, with headquarters at Orville, Ohio, to succeed **S. C. Lyons,** who has been transferred to the Williamsport division, with headquarters at Lock Haven, Pa., where he in turn succeeds **D. E. Pergrin.** Mr. Pergrin has been transferred to the Middle division, with headquarters at Altoona, Pa., to succeed **L. H. Miller. T. T. Trax,** junior engineer on the Middle division, at Altoona, has been promoted to assistant supervisor of track on the Columbus division, with headquarters at Columbus, Ohio, succeeding **John Prayso,** who has been transferred to the Eastern division, at Canton, to succeed Mr. Baldwin.

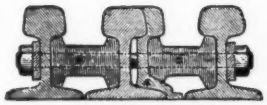
(Please turn to page 1066)

FRED. C. WEIR'S

Improved Steel Rail Frogs.

Spring Rail Frog.

Section of same.



Section of same.

Stationary Rail Frog.

The above cuts represent plans and cross sections of my improved steel rail frogs, and for the better understanding of them, attention is called to the following description, reference being made to the letters on the cuts themselves:

A shows my method of joining the short point rail to the main point rail, by which I avoid entirely the cutting of the latter, thus preserving its full strength and ***which is not done by manufacturers who notch the short point rail into the main point by cutting away either the head or flange or both as it is the common custom.***

B shows the construction of the spring or movable wing rail of my spring rail frog, by which plan of setting the inside flange of the wing rail up, and on top of the flange of the main point rail ***I avoid entirely the cutting away of the inside flange as has always heretofore been the practice, thereby saving the full strength of the rail*** as well as ensuring the point and wing rail being on an even surface when the wheels are passing over them.

C, strap for holding down spring rail and thereby taking the undue strain off from the spring bolt.

D, strap and sliding plate combined.

E, spring.

F, flexible joint by the use of which ***I am enabled to make spring rail frogs of the same length as the ordinary fixed rail frogs, thus saving a large amount of usually wasted material and which is not practicable without the use of this joint.***

G, showing one plan of construction with cast iron spacing blocks.

H, showing my manner of construction with U shaped or channel iron spacing pieces. ***The exclusive right to manufacture frogs constructed in this manner, is secured to me broadly by letters patent of the United States.***

I claim for the above improvements, the following advantages:

The strongest and most durable construction of main and short points and ***which is the vital part of any frog.***

The only spring frog constructed by which the full strength of the spring rail is preserved.

The only spring frog constructed that can be used of the same length and to be put in place of the ordinary fixed or stationary rail frogs for Standard and Narrow Gauge Railroads.

Prices furnished on application. Address,

FRED. C. WEIR,

December 1879 GRAND HOTEL, CINCINNATI, OHIO.

From this modest beginning, over 66 years ago, this company has developed into one of the major producers of special track work for the nation's leading railroads.

WEIR KILBY CORPORATION

CINCINNATI 12, OHIO — **BIRMINGHAM 7, ALA.**

Successors to

WEIR FROG CO. . . . KILBY FROG & SWITCH CO. . . . CINCINNATI FROG & SWITCH CO.

Railway Personnel (Cont'd)

Bridge and Building

S. J. Barranco, general foreman of bridges and buildings on the Pittsburgh division, has been promoted to assistant master carpenter on the Panhandle division, succeeding Mr. Mays.

B. M. Hickok, supervisor bridges and buildings on the New York Central, with headquarters at Corning, Ohio, has been transferred to Cleveland, Ohio, to replace **C. O. Henry,** who has retired.

J. W. N. Mays, assistant master carpenter on the Panhandle division of the Pennsylvania, has been promoted to master carpenter on the Conemaugh division, with headquarters at Pittsburgh, Pa., to succeed **J. A. Jorlett,** whose promotion to assistant engineer, office of chief engineer, is reported elsewhere in these columns.

Water Service

Harry F. Dahmer has been appointed water service supervisor on the Chesapeake & Ohio, with headquarters at Saginaw, Mich., succeeding **W. L. Wallace** who has retired.

Special

J. G. Wiggens, chief tie inspector of the Canadian Pacific, with headquarters at Sudbury, Ont., has retired.

Max E. Kerns has been appointed supervisor of maintenance equipment on the New York Central, with headquarters at Cleveland, Ohio, succeeding **J. C. Green,** whose death is noted elsewhere in these columns.

Obituary

C. F. Serviss, retired assistant roadmaster on the Canadian National, died recently at Morrisburg, Ont.

J. C. Green, supervisor of maintenance equipment on the New York Central, at Cleveland, Ohio, died recently.

Frank C. Huffman, who retired as assistant chief engineer of the Chicago & North Western in March, 1943, died on September 21, at the age of 72 years.

Frank Cothran, president of the Piedmont & Northern and the Durham & Southern, with headquarters at Charlotte, N.C., and an engineer by training and experience, died on September 1.

R. L. Schmid, chief engineer of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., died on August 21, following a heart attack. Mr. Schmid was born at Louisville, Ky., on March 20, 1886, and received his higher education at the University of Kentucky. He entered railroad service in February, 1906, as a rodman on the Louisville & Nashville, and in 1915 he went with the N.C. & St.L. as a pilot on valuation work. The following year he was promoted to resident engineer on construction, and in 1918 he was appointed assistant engineer with special assignments. He was promoted to assistant division engineer in 1919 and to division engineer in 1920, and from 1926 to 1939 he was assistant to general manager, with headquarters at Nashville. In September of the latter year, Mr. Schmid was appointed principal assistant engineer, and the following year he was promoted to chief engineer.

R. L. Schmid

W. H. Sparks, retired general track inspector on the Chesapeake & Ohio, at Russell, Ky., died in the C. & O. hospital in Huntington, W. Va., on September 5.

W. H. Sparks

Mr. Sparks was born at Concord, Ky., on October 10, 1871, entered the service of the Chesapeake & Ohio in 1886 as a water boy at Concord, and served in various capacities in the track department until August, 1897, when he was appointed section foreman at Riverton, Ky. Nine years later, in August, 1906, he was promoted to supervisor of track, with headquarters at Russell, Ky., where he served until 1917, when he was appointed track inspector. In 1924, Mr. Sparks was advanced to general inspector of track, the position he held at the time of his retirement in 1947. For many years Mr. Sparks had been a prolific contributor to the "What's The Answer" section of *Railway Engineering and Maintenance.*

Association News

Maintenance of Way Club of Chicago

The first fall meeting of the club will be held on October 25, and will be addressed by H. R. Duncan, superintendent timber preservation, Chicago, Burlington & Quincy, who will speak on Prolonging the Life of Crossties. The meeting will begin with dinner at 6:30 p.m., but the place of meeting had not been determined as this issue went to press.

American Railway Engineering Association

Large numbers of new members continue to join the association as a result of the membership drive that is being conducted in connection with plans for celebrating the semi-centennial year. This drive got under way on June 1, and up to September 24, a total of 500 new members had been taken in. Prior to June 1, a total of 141 new members had joined this year, so that the total to date is 641.

As a result of the large influx of new members, combined with the new regulations governing membership on committees that have been put into effect by the Board of Direction, many changes in committee membership have taken place. The difficulty of making these changes has been increased by the fact that the publication date of the Committee Roster and Assignments has been advanced from April 1 to January 1. The purpose of advancing this date is to make it possible for committees to get started on their year's work somewhat earlier than was possible heretofore.

In spite of the difficulties an effort is

(*Continued on page* 1068)

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 13-15, 1949, Hotel Stevens, Chicago. Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 15-17, 1949, Chicago, W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual Convention April 26-28, 1949, St. Louis, Mo. H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D.C.

Bridge and Building Supply Men's Association—E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting, October 25, 1948. Headquarters 105 W. Adams street, Chicago 3.

Metropolitan Maintenance of Way Club—John S. Vreeland, secretary, 30 Church street, New York.

National Railway Appliance Association—Annual exhibit, Chicago, March 14-17, 1949, in connection with the A.R.E.A. convention. R. B. Fisher, secretary, 1 No. LaSalle street, Chicago 4.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 13-15, 1949, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

Association News (Cont'd)

being made to accommodate all new members who wish to serve on committees. The secretary's office reports that this procedure will be expedited if all new members wishing to serve on committees will write to the secretary as soon as possible, stating their preference.

Wood Preservers' Association

William A. Penrose has been appointed assistant secretary of the American Wood-Preservers' Association to assist H. L. Dawson who has served as secretary-treasurer of the A.W.P.A. since 1928. Mr. Penrose has been connected with the industry since 1926 and during that time has handled various assignments. He is an attorney-at-law.

Metropolitan Maintenance of Way Club

The first meeting of the club for the current season will be held at the Sheraton Hotel, New York, on Thursday, October 28. This will be a dinner meeting, commencing at 6:30 p.m. Robert L. Groover, chief engineer, Atlantic Coast Line, will address the meeting, speaking on Maintenance Problems.

Supply Trade News

Personal

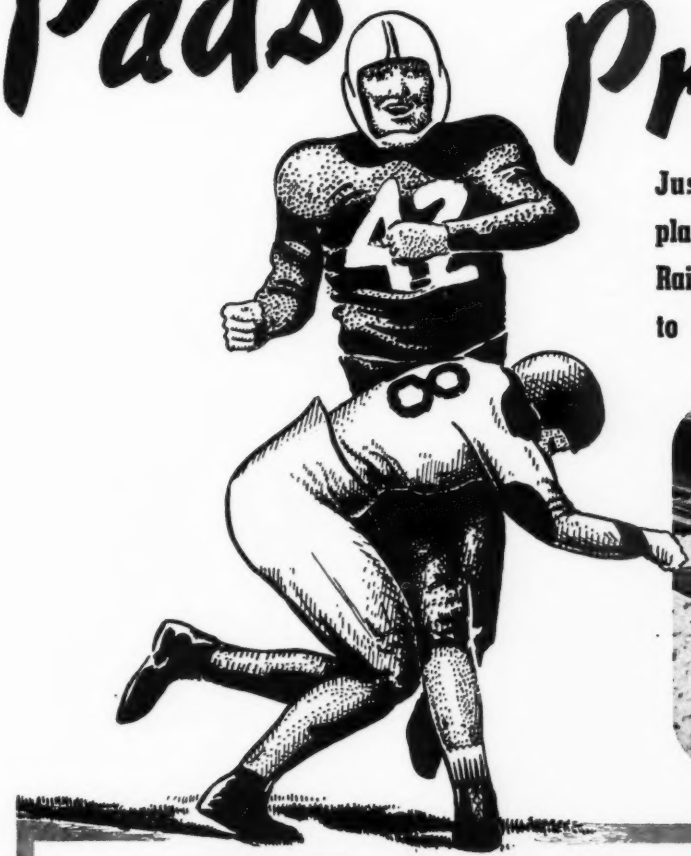
R. F. Dierking, district engineer in charge of the **Portland Cement Association's** office in Des Moines, Iowa, has been appointed manager of the association's West Central offices, with headquarters at Kansas City, Mo., succeeding **R. W. Winters,** who has resigned. **Fred F. Loy,** association field engineer in Iowa for the past 11 years, has been appointed to succeed Mr. Dierking.

John S. Conway, export sales manager for the **Koehring Company,** Milwaukee, Wis., has been appointed general sales manager to succeed **J. F. Robbins,** who has been elected president and general manager of the **Capitol Equipment Company,** Harrisburg, Pa., a Koering distributor. **R. E. Stewart** succeeds Mr. Conway as export sales manager, and **John E. Chadwick** has been appointed assistant sales manager.

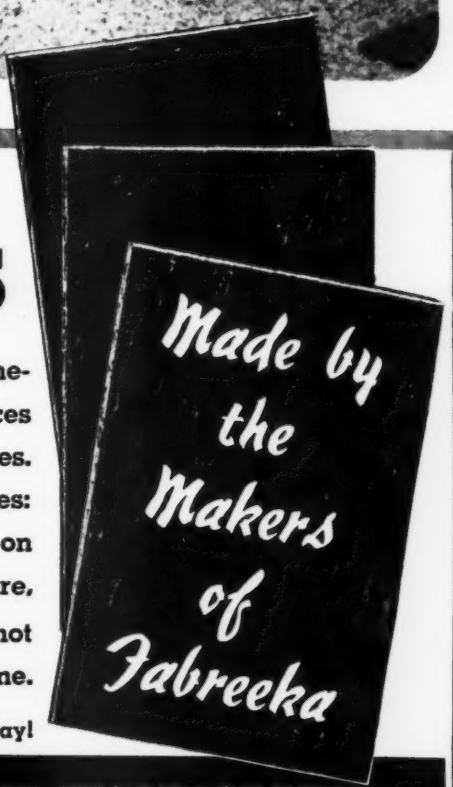
The Independent Pneumatic Tool Company, Aurora, Ill., has announced the election of the following officers: **Leonard S. Florsheim,** formerly chairman of the executive committee and a director, as chairman of the board of directors; **W. A. Nugent,** vice-president in charge of sales, as executive vice-president; and **Dr. Walter G. McGuire** as chairman of the executive committee. These elections fill vacancies created by the death of **Neil C. Hurley.**

(Please turn to page 1070)

Pads Protect!



Just as modern football protects its players with pads . . . so does modern Railroad Management use Fabco Tie Pads to protect ties against tie plate cutting.



FABCO TIE PADS

FABCO TIE PADS for Open Track reduce the mechanical wear of ties and are available at prices which definitely help reduce the final cost of ties. Stocked in 1/4" thickness, in standard tie plate sizes: 7 3/4" x 12", 7 3/4" x 13", 7 3/4" x 14". Other sizes on special order. Withstand extremes of temperature, moisture, brine, mildew, sand . . . and spikes do not have to be driven down a second and third time.

Write for further information about FABCO TIE PADS Today!

FABREEKA PRODUCTS COMPANY, INCORPORATED
222M SUMMER STREET BOSTON 10, MASS.

Supply Trade News (Cont'd)

Charles F. Reade, whose election as vice-president of the **Reade Manufacturing Company, Inc.,** was announced in the September issue, was born at Weehawken, N.J., on April 27, 1916, and attended the University of Virginia. Mr. Reade started his business career as a laborer

Charles F. Reade

with the Reade Company in 1934, later serving as a salesman on weed killers. In January, 1941, he went with the Rail Joint Company, returning to the Reade Company in August, 1942, as manager of the Chicago office, which position he held until his appointment as vice-president.

Allen I. Barr has been appointed western sales manager of the **American Creosoting Company,** at St. Louis, Mo.

C. P. Corrigan, formerly sales representative, has been appointed district sales manager for the Cleveland, Ohio, area of the **Ramapo Ajax division** of the **American Brake Shoe Company.**

John Druml has been appointed chief inspector of the general machinery division of **Allis-Chalmers Manufacturing Company,** Milwaukee, Wis., and **Samuel W. Ouweneel** has been named chief inspector of the Tractor division. They succeed **G. William Warner,** who has retired.

H. M. Church, retired general supervisor of bridges and buildings of the Chesapeake & Ohio, has established an office at 509 N. Boulevard, Richmond, Va., where, in association with H. M. Church, Jr., he will conduct a consulting engineering and inspection service specializing in forest products and wood preservation.

Walter W. Kemphert, formerly with Worthington Pump & Machinery Corp., has been elected vice-president in charge of sales of **Skilsaw, Inc.,** Chicago. **J. J. Topolinski,** works manager of this company, has been elected vice-president in charge of manufacturing.

Walter H. Haas, formerly engaged in private contracting work, and **J. B. Akers, Jr.,** formerly with Ralph W. Payne, have organized the firm of **Haas and Akers,** manufacturers' representatives, with offices in the Dupont Circle building, Washington, D.C.

(Please turn to page 1076)

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index

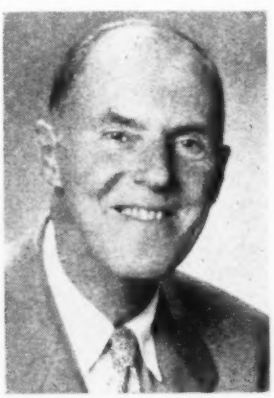
Supply Trade News (Cont'd)

M. B. Garber, whose appointment as general sales manager of the **Thew Shovel Company,** Lorain, Ohio, was noted in the September issue, was born near Springfield, Ill., and attended Princeton university and Carnegie Institute of Technology. During World War I he was a 2nd lieu-

M. B. Garber

tenant, artillery observer with the U. S. Air Force. After the war he joined the Sanderson-Cyclone Drill Company, Orville, Ohio, and in 1927 he went with the Thew Company as sales office manager, later covering territories in the Middle West and Canada. In 1937 Mr. Garber was placed in charge of the export department and, in addition, acted as assistant sales manager, which positions he was holding at the time of his recent promotion.

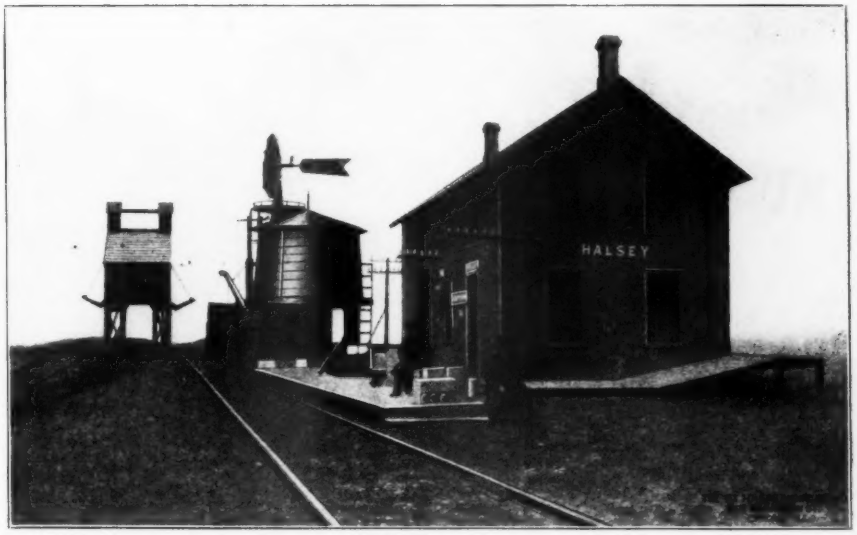
Q. J. Winsor, whose appointment as assistant general sales manager of the **Thew Shovel Company,** Lorain, Ohio, was noted in the September issue, was graduated from the Case Institute of Technology in 1916 with a degree of Bachelor of



Q. J. Winsor

Science in Civil Engineering. Following his graduation, he joined the Universal Crane Company, a Thew subsidiary, as assistant sales manager and advertising manager. He has been connected with the parent company since 1919.

(*Please turn to page* 1078)



Streamlined wonders of their day were the facilities pictured in this pair of antiques from our advertising files.

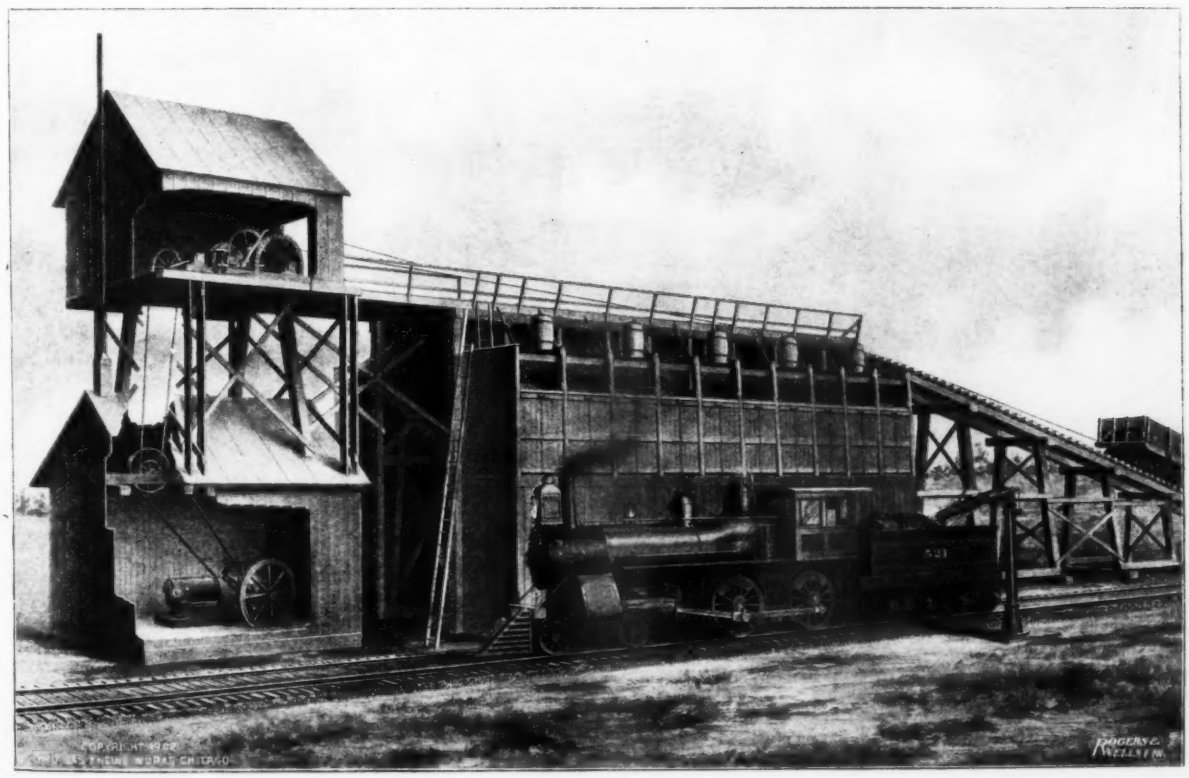
Since 1900 the organization that constructed these facilities has been designing and building similar structures to meet progressive demands.

The First Hundred Years

THE growth of the Chicago and North Western through ten eventful decades is a prime achievement in railroading, made possible by the contributions and co-operation of thousands of inter-related businesses, like the T. W. Snow Construction Co., each functioning to furnish necessary parts and goods and services to the great railroad industry.

T. W. SNOW CONSTRUCTION CO.

9 So. Clinton St., Chicago 6, Ill.



Supply Trade News (Cont'd)

J. T. Cushing, whose appointment as assistant general sales manager of the **Thew Shovel Company** was reported in the September issue, was born in Elyria, Ohio, in 1908, and attended Brown university. He went with the Thew Company in

J. T. Cushing

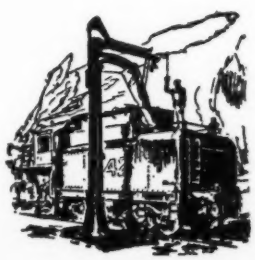
1931, and following four years of shop and factory assignments was appointed district salesman for Michigan and Indiana. In 1942 Mr. Cushing was advanced to district sales manager at San Francisco, and was holding this position at the time of his recent appointment as assistant general sales manager.

G. F. Carpenter, formerly district maintenance engineer on the Chicago, Rock Island & Pacific with headquarters at Des Moines, Iowa, has joined the **Reade Manufacturing Company, Inc.,** as sales engineer, with headquarters at Chicago.

Obituary

Thomas B. Lehon, vice-president of the Lehon Company at Chicago, manufacturers of roofing materials, died in his sleep on September 8, following an illness of several months. Mr. Lehon, one of the organizers of the firm in 1905, was born in Oswego, N.Y., on October 17, 1875.

Harry H. Barber, chairman of the board of directors of the Barber-Greene Company, Aurora, Ill., manufacturers of bituminous road building equipment and material handling machinery, died on September 6. Mr. Barber, one of the pioneer designers of modern construction equipment, had been board chairman since September 25, 1945, at which time he retired as president of the firm.



Trade Publications

(To obtain copies of any of the publications mentioned in these columns, use postcards, page 1073)

Portable Material Elevator—The American Hoist & Derrick Co. has published an eight-page catalog covering its portable material elevator. The bulletin gives complete mechanical details regarding the elevator, and is liberally illustrated with photographs of the unit in operation on a variety of jobs.

Portable Air Tools—The Independent Pneumatic Tool Company has released a four-page illustrated catalog describing its portable air tools for mining and construction. The pamphlet, identified as Catalog No. MC-1, contains pictures and specifications of such tools as paving breakers, clay and trench diggers, sump pumps, drills, pneumatic and electric saws, etc.

Ion Exchange Materials—The National Aluminate Corporation has recently published an attractive 36-page bulletin entitled, "Nalco Ion Exchange Materials." The booklet, which is liberally illustrated, is conveniently indexed and is divided into three sections. The first section outlines ion-exchange principles, and gives the general characteristics of ion-exchange materials, etc. The second section gives complete technical data on these materials, and the third section contains information on a number of the processing purposes to which Nalco ion-exchange materials are being put.

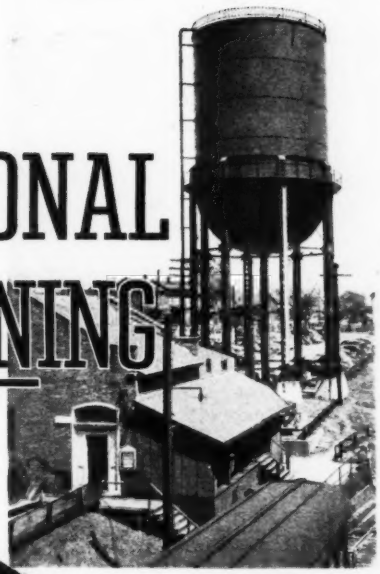
Railroad Cleaning Handbook—A 26-page booklet describing the applications of its various cleaning materials in the railway field has been published by Magnus Chemical Company, Inc.

Power Tools—Catalog No. 486, which illustrates and describes its entire line of power tools, has recently been issued by the Syntron Company. This 24-page bulletin outlines the uses of portable electric hammers, gasoline hammer paving breakers, concrete form vibrators, drills, grinders, sanders, etc., and contains numerous photographs of the tools in operation.

Report on Treated Wood—The American Lumber & Treating Co. has issued a 40-page illustrated booklet dealing with service records on Wolmanized treated lumber. This bulletin contains tables showing the results of inspections of Wolmanized treated lumber in service, including installations in wet-process factories, railroad structures, bridges, mines, refrigerated buildings, and water works. It also contains numerous photographs.

More for Your Building Dollar—This is the title of a six-page folder, published by Armco Drainage & Metal Products, Inc., describing and illustrating the uses and advantages of Standard Armco Steelox buildings. Included in the booklet are general data showing range of sizes, types of doors and windows, partitions, ceilings, louvres and ridge ventilators. The folder comes in three editions describing the specific applications for which the buildings may be used by industry in general, the mining industry, and the railways.

NATIONAL CLEANING



After cleaning the N. & W. no longer had to operate a booster pump or purchase 350 gpm of city water to keep this 400,000 gallon tank full

Before removing incrustation from 12-inch line.

Restores Clogged Lines to Capacity on Norfolk & Western

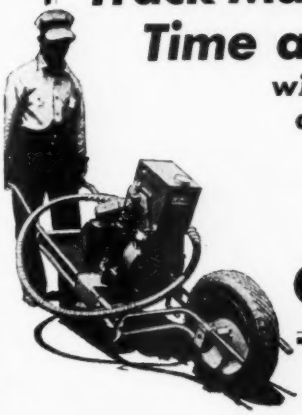
Your piping may need cleaning just the same as did that of the Norfolk & Western where 7,740 feet of 12-inch line at Roanoke, Va. and 5,877 feet of 18-inch line at Pine Hall, N. C. were so badly incrusted as to be incapable of meeting normal requirements.

Cleaning by National *not only restored both lines to full capacity* but made the purchase of city water and operation of a booster pump no longer necessary, saving the N. & W. approximately $120 per month.

For a reprint of article describing the above operation and other information on how National has solved this costly problem for other railroads, write today. 32

NATIONAL WATER MAIN CLEANING CO.
51 CHURCH STREET, NEW YORK 7, N. Y.

REDUCE . . .
Track Maintenance Time and Cost with a Mall TRADE MARK PORTABLE RAIL GRINDER



- ★ *Off-The-Track*
- ★ *Easily Portable*
- ★ *Efficient*
- ★ *Safe*
- ★ *Economical*

You can reduce wear and tear on rolling stock, reduce road bed maintenance and increase rail life with this powerful, light weight off-the-track 6 H.P. Mall Rail Grinder. The variable speed gasoline engine provides abundant power for smoothing off rail joint welds, grinding frogs, switch points and crossings.

Attachments, quickly interchangeable with grinding wheels, can be furnished for drilling rails, ties and crossing planks, drilling holes for lag screws, wire brushing and other jobs. The patented slip lock detail on ends of heavy duty flexible shafting and on various attachments speeds up tool changing. Ruggedly constructed to stand up under hard continuous use. Pneumatic wheel makes for easy rolling. This unit will quickly repay its original cost in lower maintenance and grinding costs.

Complete Catalog Upon Request

Railroad Department

MALL TOOL COMPANY

7746 South Chicago Ave. **Chicago 19, Illinois**

MALL REPRESENTATIVES: Allied Tools & Supply Co., Louisville; John N. Thorp Co., New York; Hubbell & Co., St. Louis; D. N. Carlina Co., Pittsburgh; R. W. Hudgins & Son, Norfolk.

Mall REG. U.S. PAT. OFF. PORTABLE POWER TOOLS

Barber-Greene

Cuts unloading time as much as 90%

Cuts costs in HALF!

A hopper-car unloaded to trucks or to stock pile by one man . . . in forty-five minutes! **This is the proved day-to-day performance of the new B-G 358 Hopper-Car Unloader and 363 Conveyor.**

Model 358 All-Purpose Unloader

MODEL 358 ALL-PURPOSE UNLOADER handles any material. Working over rails or in pits, it unloads a carload in as little as 45 minutes, with no jamming, no delays. Positive non-slip drive, sturdy antifriction bearings, Alemite fittings . . . assure years of dependable service. A perfectly balanced machine, it moves easily by hand, trails at road speeds.

Model 363 Portable Conveyor

MODEL 363 PORTABLE CONVEYOR establishes a new standard of lightweight portability combined with strength and efficiency. Pneumatic-tired wheels swivel for radial stock-piling; self-cleaning hopper end with removable cover and hopper plates assures longer belt life; antifriction bearings and belt idlers provide smooth operation. 24" belt; lengths, 25', 30', and 35'.

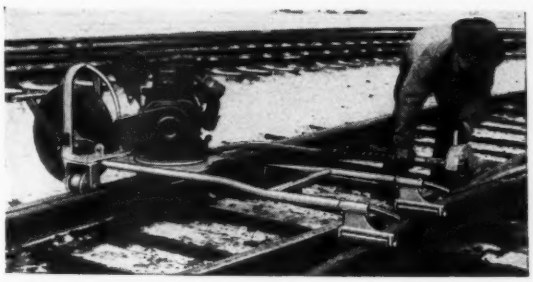
Send for literature! Address Barber-Greene Company, Aurora, Illinois.

104A

Barber-Greene

Constant Flow Equipment

NEW FEATURES... MORE SAVINGS



***with the* P-44 Track Grinder**

The new model P-44 Portable Flexible Shaft Grinder is designed to give you added savings in labor and costs when you lay new track or repair old. Look at these many advantages:

- Grinder's 360° swivel engine mount prevents short bends and kinking of flexible shaft.
- Clutch assembly in the engine protects shaft from overload.
- Three position wheel clears switches and crossovers easily. Quickly adjusted for off track use.
- Light and compact, it gets on and off the track fast. Can be used under heavy traffic.
- Quickly adaptable for auxiliary equipment: Straight Wheel Hand Piece, Angle Hand Piece for Cup Wheel, Cross Grinder Guide and Track Drill.

Speed . . . Power . . . Economy . . . work side by side with your track gang when you equip them with a P-44 Track Grinder. Write us for further details.

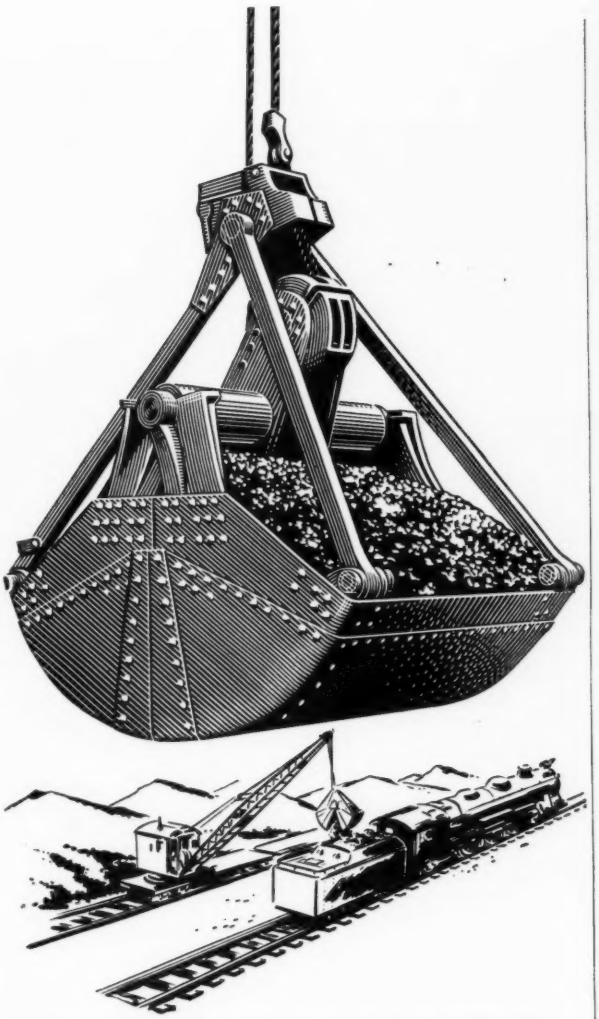
1353

Railway Trackwork Co.

3207 KENSINGTON AVE., PHILADELPHIA 34, PA.

AGENTS FOR

Kershaw-Railway Maintenance Equipment and Mark-Rite Point Marker

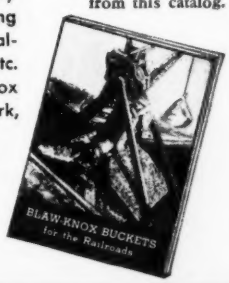


BUSY BUCKETS

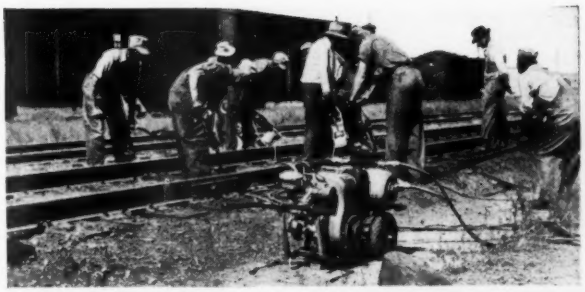
For the railroads Blaw-Knox builds buckets that are kept busy on many jobs . . . fueling engines, rehandling from stock piles, ash pit service, ballast rehandling, barge clean-up, etc. For a quick appraisal of Blaw-Knox Buckets widely used for railroad work, write for Bulletin 1989.

BLAW-KNOX DIVISION
of Blaw-Knox Company
2054 Farmers Bank Bldg.
Pittsburgh 22, Pa.

You can select *the bucket you need* from this catalog.



BLAW-KNOX BUCKETS



This tamping scene shows the single cylinder Wisconsin powering a tamper made by the Electric Tamper and Equipment Co., Ludington, Michigan.

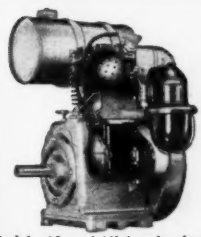
BALANCE *High Wages* WITH *More Production*

During these days of high wages, when the accent in equipment must be on *more production* at less cost, your best buy still remains Wisconsin Air-Cooled Engine-powered equipment. It's your best investment in multiplied *man* and *machine output* and reduced maintenance costs in all seasons, in all localities.

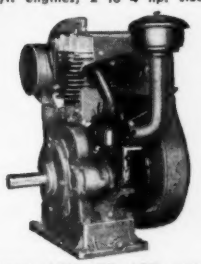
By specifying Wisconsin, you eliminate water and anti-freeze maintenance, yet get year-round instant starting and efficient operation under all conditions.

Furthermore, you'll find that selecting Wisconsin-powered equipment is your easiest job . . . Wisconsin Engines form the husky "hearts" of many of the leading track tools, including tampers, tie cutters, kribbers, rail and frog grinders, air compressors, motor cars — equipment leading to better roadbeds and generally improved maintenance at lowest cost.

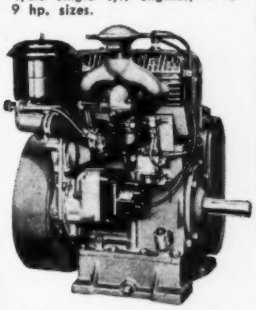
Whether it's the smallest 2 hp. single, or the largest 30 hp. four, established builders consistently stake their reputation with ours, in equipment producing the "MOST HP. HOURS."



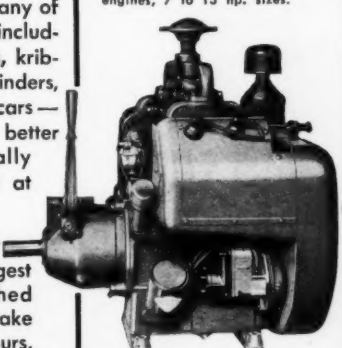
Models AB and AK 4-cycle single cyl. engines, 2 to 4 hp. sizes.



Models AEH, AFG, AGH, AHH 4 cycle single cyl. engines, 4 to 9 hp. sizes.



Models TE and TF 4-cycle 2 cyl. engines, 7 to 13 hp. sizes.



Models VE-4 and VP-4 V-type, 4 cyl. engines up to 30 hp.

MOST H.P. HOURS

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 14 WISCONSIN

It Can't Be Overdriven!

The improved
GAUTIER
RAIL ANCHOR

THE improved GAUTIER is a one-piece rail anchor that can be applied with a spike maul and because of its construction—*it can't be overdriven!*

This exclusive development, when considered in conjunction with its demonstrated ability to anchor rails under all types of track conditions, makes it the outstanding rail anchor available today.

Mid-West Forging & Manufacturing Co.
General Offices: 38 So. Dearborn St., Chicago 3, Ill.
Manufacturing Plant, Chicago Heights, Ill.
Eastern representative: Moore & Steele Corp., Owego, Tioga County, N.Y.

NEW! **ALUMINUM ALLOY TRACK JACK**
41½ LBS. LIGHT!

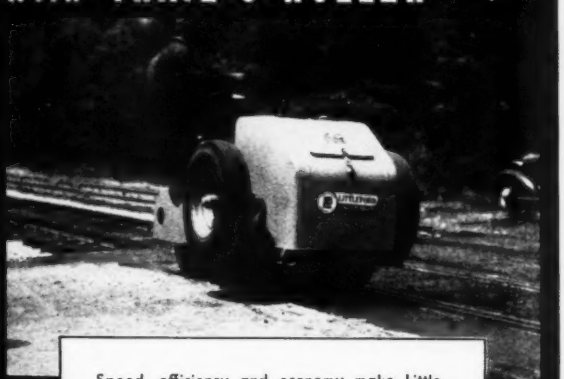
SIMPLEX - ENGINEERED
FOR 15 TONS OF POWER

A track jack that's really new! That's the Simplex A17. Made of aluminum alloy for easy portability, yet *engineered* to provide the strength and power of heavier jacks through 40% extra support at stress points. The toe lifting area has been increased more than 100% (2½" x 3¼") to permit jacking under ends of ties without damage.

Shorter fulcrum center for easier lifting; new socket and lifting pawl construction to reduce parts replacement. Safety thumb guard protects operator when tripping jack. Lifts full 15 ton capacity on cap or toe; overall height 22¾" with 13" lift. Get complete details in new Bulletin Track 49.

Simplex
LEVER SCREW - HYDRAULIC
Jacks
TEMPLETON, KENLY & COMPANY
1026 S. Central Ave., Chicago 44, Illinois

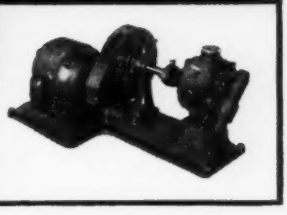
Dozens of Repair Jobs in a single day.... with **TRAIL-O-ROLLER**



Speed, efficiency and economy make Littleford's TRAIL-O-ROLLER an invaluable part of your black top maintenance crew. It trails the maintenance truck at any speed, yet brings the compaction of a five-ton tandem roller to your crossing and platform repairs. Patented hydraulic lift permits changing from trailing to rolling or back again in two minutes flat! Better crossings make friends. Write for catalogue.

LITTLEFORD
LITTLEFORD BROS., INC.
471 E. Pearl St., Cincinnati 2, Ohio

VIKING...
The Rotary Pump Built to Create and Retain YOUR CONFIDENCE



The building of a piece of equipment to win your confidence is the aim and purpose of every Viking that leaves the factory.

Confidence can only be *won* and *retained* with a pump that will actually go out and do the job it is sold to do.

Look to Viking for the pump that builds confidence.

A self-priming, simply and ruggedly constructed pump suitable for delivery against discharge pressures.

Write today for free bulletin 47SY. It will be sent immediately.

See Our Catalog in SWEETS

Viking PUMP COMPANY
Cedar Falls, Iowa

ALPHABETICAL INDEX TO ADVERTISERS, OCTOBER, 1948

On thousands of miles of track, in all parts of the country, under every conceivable condition of weather and wear Improved Hipowers play an invaluable though inconspicuous role.

They serve continuously—absorbing shocks and stresses, equalizing bolt tensions, insuring resilient joints, and protecting rail ends.

IMPROVED HIPOWERS

IMPROVE TRACK

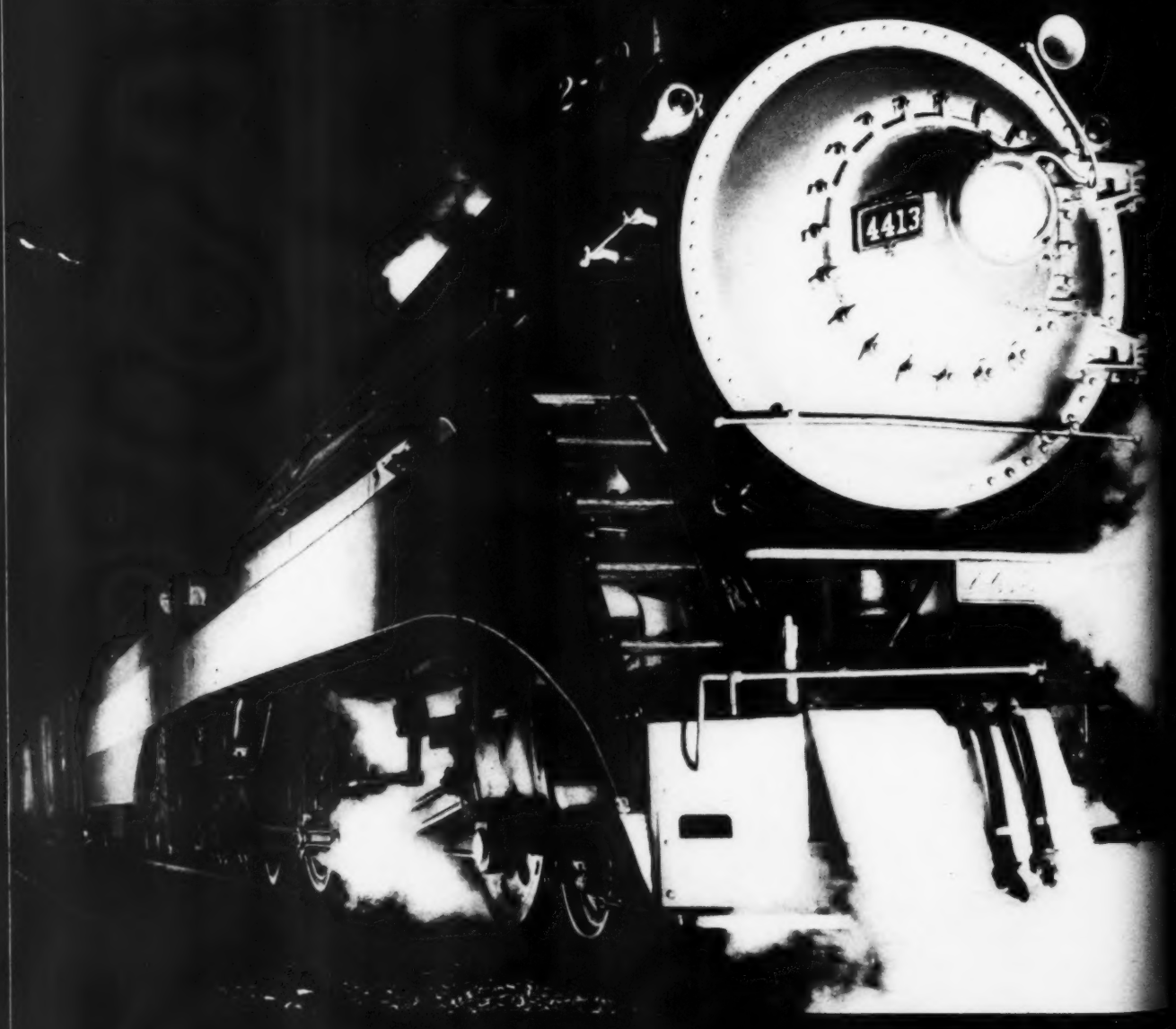
THE NATIONAL LOCK WASHER COMPANY, NEWARK 5, N. J., U. S. A.

A COMPLETE LINE OF RAILWAY SPRING WASHERS

COMPRESSION

Rail Anchors

Day and night — year in and year out — Compression Rail Anchors provide efficient, dependable protection against creepage in either direction. Two-way holding means uniform expansion at the rail ends — a better, more economical track structure throughout.



THE RAILS COMPANY

General Office

178 GOFFE STREET, NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, Ill.